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Spoiling the Athenæum Club.

THOSE who have passed Waterloo-place recently must have noticed the large erection of scaffolding and temporary roof in process of construction on the top of the present roof of the Athenæum Club. That the club is about to enlarge its premises has been known for some time, and though this fact may be chiefly interesting to the members of the club, it has from an architectural point of view a considerable interest for outsiders. In itself the building, though connected with the respected name of Decimus Burton as architect, is not a remarkable one architecturally; it is in fact one of the least characteristic of the Pall Mall clubs—a square block relieved by little but the reproduction of the Parthenon frieze which runs round it, and with the defect that it is cut into two almost equal halves, vertically, by the projecting balcony beneath the first-floor windows. But it is of considerable architectural importance from its position, for it forms one of the two blocks of building, the United Service Club being the other, which almost symmetrically flank the southern area of Waterloo-place, leading to the steps and the column; and in fact the exterior elevation of the United Service Club was altered, by Burton, since its first erection, in order to make it coincide more nearly with the balancing elevation of the Athenæum.

As the club intend to add another story to their premises in order to obtain the increased accommodation desired, it is a matter of importance to the architectural effect of the neighbourhood how this addition is carried out. Unfortunately, it appears that the scheme intended is one which it is impossible to approve, on architectural grounds, either in regard to the building itself or the general effect of Waterloo-place; and it may be added that in a structural sense also the scheme is very objectionable. What is contemplated is this. The committee of the club have engaged Mr. T. E. Collcutt as architect, and he has no doubt been struck, as every architect would be, with the difficulty of adding to the building vertically in such a manner as not to interfere with the general effect and proportion of the group. But the treatment he is proposing seems to us one of the most unfortunate, having regard to the importance and monumental character of the building, that could have been devised. His view seems to have been that if he could set back the new story 6 ft. from the front line of the building all round, the eye would not be unduly canght by it, and the existing cornice line would still rule the position. If the top addition could be entirely hidden from view from the street there would be something in that; but it is obvious that it cannot be so; to contain rooms of any serviceable height it must be of such a height that it will be plainly seen above the balustrade line. Then we shall have the spectacle of a large building, designed with classic regularity and dignity, carrying on its roof a structure of inferior character and which has no obvious means of support, being erected within the main walls. That is one of the worst features of the proposal; there are no walls, of course, 6 ft. inside the main walls, to carry this erection, which was to be carried on girders specially put in; and though any architect would know, on looking at it, that this must be the construction, he would none the less feel that this was a most illogical and unsatisfactory way of treating a first-class building; all the more so when, as we believe is the intention, the added structure, in order to secure lightness, is to be constructed of steel and cokebreeze concrete. We can hardly imagine a more direct and decisive way of destroying the dignity of the building. Moreover, of course, the adoption of this scheme means an absolute waste of a great portion of the space which is wanted for new accommodation, a point which, as we shall see, is quite present to the minds of a good many members of the club, who feel that they are going to the expense of an addition with a quite inadequate result in the way of accommodation.

As the increased accommodation appears to be seriously required, and practical considerations must come first, the symmetry of the building with its opposite must be destroyed at any rate, and the best procedure would have been to recognise this frankly; to raise the outer walls, but leaving the cornice where it is, and treating the upper portion as an attic in a quiet and unobtrusive manner, keeping the height down as much as convenience would allow. The main cornice would then still be the leading line to the eye; the construction would be right, and the full extent of area would be utilised. The scheme actually proposed is absurd and unsatisfactory both in an æsthetic and a practical sense.

But there is another side to the matter, in which professional etiquette is concerned, and in regard to which the behaviour of the club committee and their architect seems to have been equally unfortunate, to use a mild expression. Most of the large clubs in London have an architect officially retained on their behalf. The Athenæum Club has had an official architect since its erection; only three gentlemen have successively filled the post, viz., Decimus Burton, when the club was first completed; the late Thomas Henry Wyatt; and Mr. Charles Barry, who in 1881 was unanimously appointed architect to the club on the motion of Captain Douglas Galton, seconded by Professor Donaldson. In 1889 a notice was given for the general meeting of that year "that the office of architect to the club should be discontinued" (for what reason we do not know), but the notice after due consideration by its mover and seconder was formally withdrawn; Mr. Barry therefore remained architect to the club; and when the enlargement of the club was first considered in 1887 prepared two sets of plans, which received the approval of the Building Committee, though the work was postponed. It will easily be understood, therefore, that Mr. Barry was as much surprised as we think most of our readers will

be, to learn that when the carrying out of the additions was finally decided upon, the committee had been for some months, behind his back, in communication with another architect, and had accepted that architect's plans whilst he (Mr. Barry) was holding the official position of architect to the club. Mr. Barry's view of the matter is expressed in the following extract from a letter addressed by him to the committee, in May last, and which was printed for circulation among the members :—

"When the question of enlargement was considered in 1887-1888, I prepared two separate sets of plans and negotiated the terms of an extended lease from the Office of Works, and received in both cases the unanimous approval of the Special Building Committees then appointed.

I rendered these services at considerably less than the usual professional charges, because I was 'the club architect,' and as to the negotiations with Government, resulting in an offer of a new lease for sixty years at 1,200*l.* a year, and conducted by me on behalf of the committee, I made no charge whatever.

I must say that the present action of the committee is an ill reward for my having so acted.

As, however, I should never wish to work for an unwilling client, I do not desire on the present occasion to press any rights I may have legally or even as a matter of the usual courtesy to a professional man, though I feel that both have been disregarded.

Under the circumstances I feel that the only course consistent with my self-respect is to place my resignation as architect to the club in the hands of the club, and now do so."

To this the committee replied in a letter assuring him that no "discourtesy was intended;" in regard to which we can only say that they must have odd notions about what constitutes discourtesy. Mr. Collcutt's action is equally difficult to understand. If he was not aware of Mr. Barry's position in relation to the club, at the outset, at least he must have become aware of it before matters went very far, and it appears to us that for another architect to have entered into work for the club when he knew that their official architect, a well-known member of the profession, was "in being," was what may be called an unprofessional line of conduct, unless there is some explanation of it which is not before us.

The following is an extract from a memorial addressed to the committee in April, and signed by twenty-six members of the club :—

"The proposition of setting back the attic story by 6 ft. involves a sacrifice of from 15 to 20 per cent. of the area otherwise available for increase of accommodation, when every square yard in such a position is, in our view, of consequence, and more than half the floor area which remains is to be allocated to servants' bedrooms. The result is that the new smoking-room cannot be looked upon as the general smoking-room of the whole club. It is far too small, and therefore the use of the present small smoking-rooms on the first floor and in the basement will have to be continued. Most certainly the new smoking-room ought to be large enough to be a smoking-room for the whole club, and of such a size as is provided in other clubs.

From the structural point of view the proposition to carry the walls of the attic story on false bearings, instead of upon the external wall, is, in our opinion, a mistake, and the suggested steel and thin walls made of breeze concrete, and the flat copper roof, will cause the attic story to be cold in winter and hot in summer.

The club has in its possession the drawings which were prepared in 1888 for an additional story for the premises, which provided one complete floor for the members and another complete floor for the servants.

We desire that these plans should at once be placed in the library for the inspection of the members, and they will see that, although the additional story was carried up on the walls of the club, so far from its interfering with the appearance of the building, it improves the design."

Mr. Barry's design shows a new story added on nearly the same scale as the first floor, and with the cornice and balustrade raised to the new position. As may be inferred from what we have already said, we do not think this the best way of doing it; we should have preferred to keep the cornice where it is and build an attic. But Mr. Barry's scheme is at all events better in effect and more practical in the sense of structure and accommodation than the one now proposed to be carried out; and we think Mr. Barry has good reason to complain that he has been badly treated in the matter.

NOTES AT ST. PETERSBURG.

THOUGH a visit to St. Petersburg cannot but be depressing to an architect who sees the magnificent schemes of Peter the Great spoilt through antiquated municipal ideas and lack of that building activity which, in the sixties and seventies of this century, tended so much to improve cities like Berlin and Vienna, it is satisfactory to note that there is, at all events, some perceptible difference in the buildings erected to-day from those put up some ten years back, and that there is a far greater activity in the construction of buildings on modern lines than ever has been the case before.

The reason for this activity is not difficult to find, inasmuch as the reduction of interest on the Russian Government scrip has led capitalists (and there are many of them in St. Petersburg) to suddenly turn to real estate for investment, and we know of at least two cases where well-known business men have been individually investing in new "bricks and mortar" to the extent of several hundred thousand pounds. There has even been of late years what is vulgarly termed a "boom" in building sites and plots, and some for which we have seen quotations in 1897, will, at present, scarcely change hands at double the prices then named. That modern buildings are greatly appreciated is noticeable from the fact that a well-built tenement house, equipped on modern lines, is generally let before the foundations are put in, and this appears to have even encouraged foreign capital—mostly Belgium money—to be applied to similar purposes.

These tenement houses are erected on a very large scale, and we frequently find them planned on the lines of a large block of buildings facing two sides of a private thoroughfare, the private thoroughfare then running into one of the main arteries of the city. We have noticed blocks of this description, comprising, say, two hundred tenements, some ten or twelve tenements always being approached from one staircase. The banks, insurance offices, and large wholesale houses are also building new premises, and there also seems to be a tendency to the erection of office blocks in the main thoroughfares, to be cut up into a number of small offices.

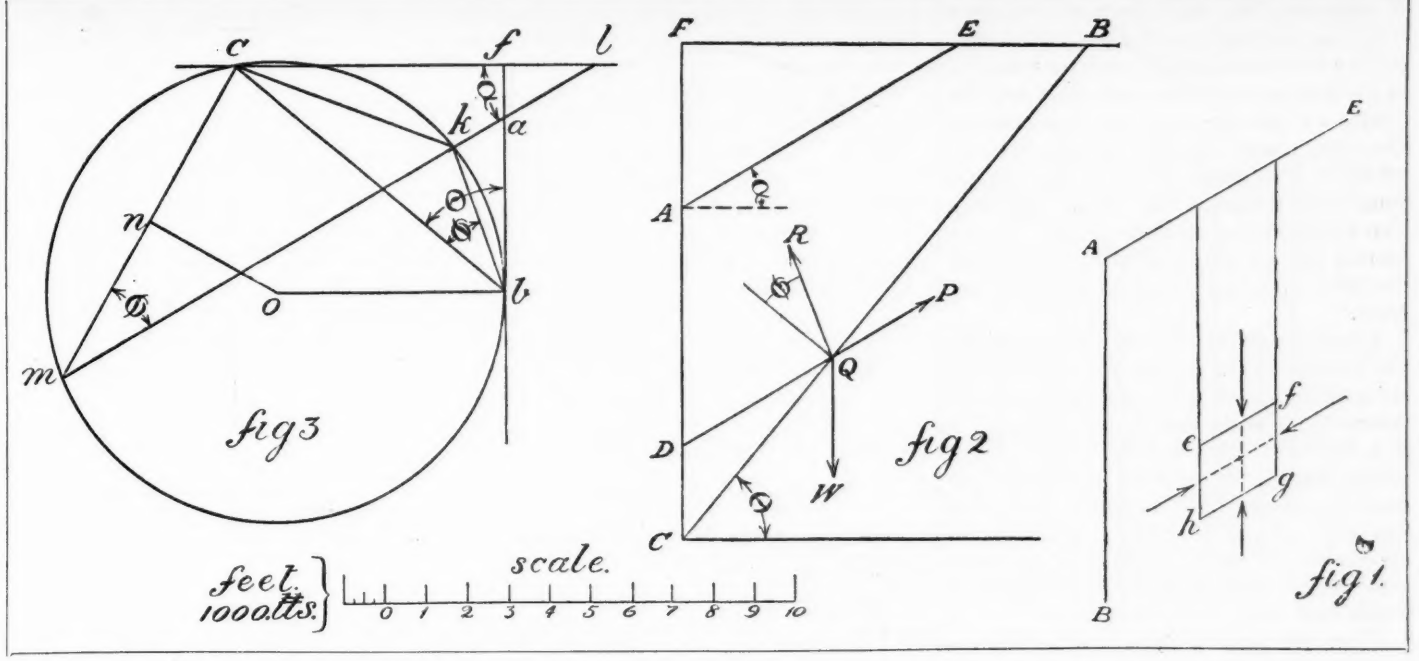
As to municipal and public buildings, on the other hand, the activity does not appear to be as great as might be expected, and perhaps the most noticeable of public buildings is the new Memorial Church to Alexander III., which is being erected in a manner regardless of expense, and is being lined in a most elaborate fashion with mosaic work. We understand, however, that the municipality will shortly be undertaking a number of important works under the direction of Count Suzor, their able City Architect.

Mentioning Count Suzor and his great influence on the present development of the Russian capital, it may be of interest in this country to observe that the leading building officials in the Czar's dominions are allowed to engage in private practice, and that we find the city architects in large centres, and architects holding posts in the Home Office or in the Imperial Administrations, engaging in other work beyond that with which they are officially associated. In many ways the same policy appears to have been observed as used to be the case with the appointment of our own district surveyors, and we have heard it very energetically argued at St. Petersburg that it is in the interest of the Public Authorities that their architects should practice privately, inasmuch as there is then less risk of their becoming mere administrators, and so getting out of touch with the practical and artistic part of their work.

It is, of course, curious from our point of view to see an exceedingly busy City architect also engaged with an enormous practice; but, given able men, the system seems to work quite as satisfactorily as it does with our district surveyors who are engaged on the old system. Of course, these principles are quite contrary to the recognised ideas of official work generally to be found on the Continent, and it is thus the more remarkable that the combination of official and private work is so much encouraged as it is in Russia.

In sanitary matters, on the other hand, St. Petersburg is still very much behindhand. Some eight years back we had occasion to describe the new drainage system of Warsaw, and to remark that this was the only modern sewage system to be found in the Russian Empire. We then, however, already mentioned that a scheme was under preparation for St. Petersburg, Mr. Lindley, the former City Engineer of Frankfort, being the designer. All this time, however, has elapsed without any progress being shown, and St. Petersburg still merits the position of being the worst drained capital in Europe. It appears that this sewage question has long been the subject of close study in the Municipality, but as the doings of the popularly elected body of St. Petersburg are practically of little importance as compared with the authority of the Police Prefect, it is not to be wondered at that until the latter has actually *ordered* a sewage system to be constructed, there is little hope of anything of this kind being done.

Considering this backwardness about sanitation, it is rather surprising to find that the Russian capital is the first to follow the example set in London, and establish a fully equipped testing station in connexion with its recently formed "Fire Committee." This scheme seems to have been taken up with great vigour, so much so that the Russian Society is already in possession of a permanent travelling exhibition, which is carried from town to town in a very handsome set of railway carriages, and also another travelling exhibition in the form of a large ship, which travels from town to town along the rivers and canals, the idea being that in such a vast territory as that of the Russian Empire the modern means



practised in the large centres will only find application in the provinces if they can be seen and appreciated full size, as distinct from the mere system of cataloguing and sample-sending practised elsewhere. The committee has for its Hon. President the Grand Duke Vladimir; as chairman Prince Alexandre Levoff, and as architectural members, Count Suzor, the City architect, Professor Schroeter, the Czar's theatre-architect, and Professor Kuttner, the Home Office architect. It has already received large financial grants from the Government, from the Emperor, and others, and we believe, in fact, possesses a bank balance at the present moment exceeding 10,000*l.*

GRAPHIC METHODS OF DETERMINING THE PRESSURE OF EARTH ON RETAINING WALLS.

BY P. R. KIRK, A.M.I.MECH.E.

RANKINE, in his "Applied Mechanics," deduces the directions of the pressure in a mass of earth somewhat as follows:—

Let A E (fig. 1) be the line of greatest slope of the surface of the earth, and D a point at a vertical depth h from the surface.

Let $efgh$ be a small mass of the earth containing D, of unit thickness in a direction at right angles to the line of greatest slope, of which the sides ef and hg are parallel to A E and equal to each other, and the sides eh and fg are vertical and equal to each other.

The pressure on the elementary plane ef is vertical and uniformly distributed, since it is caused by the weight of the earth resting on it; and its resultant passes through the middle point of ef. The pressure on hg is evidently vertical and equal to that on ef together with the additional pressure caused by the weight of the mass $efgh$; but since this mass is small the pressure caused by its weight is negligeable compared with the pressure on ef, and the pressure on hg is sensibly equal to that on ef and in the same direction, and since it is uniformly distributed, its resultant passes through the middle point of hg and is in the same straight line with the resultant pressure on ef.

Since the resultant pressures on the faces ef and hg of the mass $efgh$ are equal in magnitude and act along the same straight line, they counteract each other, and it follows, since the mass $efgh$ is in equilibrium, that the resultant pressures on eh and fg must counteract each other, that is, they must be equal to each other, and act along the same straight line.

Now eh is small, and the pressure on it is practically uniformly distributed, so that its resultant passes through its middle point, and for the same reasons the resultant pressure on fg passes through the middle point of fg.

But since these resultant pressures must act along the same straight line, they must both act along the line joining the middle points of eh and fg, a line which is parallel to ef and, therefore, to A E, the line of greatest slope of the surface of the earth.

Consequently the directions of the pressures in a mass of earth are as follows:—

1. On a vertical plane the pressure is parallel to the line of greatest slope.

2. On a plane parallel to the line of greatest slope the pressure is vertical.

I. Pressure of earth against a retaining wall with a vertical surface.

Fig. 2 represents a vertical section of a bank of earth of height equal to C F, with a sloping face A E, resting against the vertical face A C of a retaining wall.

If A E makes an angle α with the horizon, this angle α must not be greater than ϕ, the angle of repose of the earth.

The vertical face A C of the wall prevents the earth from sliding down some plane such as C B, and the wall exerts a force P, which resists this sliding tendency of the earth.

Let CB be this plane inclined at an angle θ to the horizon, down which this tendency to slide is a maximum, and let w be the weight per cubic foot of the earth.

We will consider the forces acting on the mass of earth A E B C, 1 ft. thick, in a direction perpendicular to the line of greatest slope; the forces acting on it are:—

1. The weight W of the mass A E B C, which is equal to the weight of the triangular mass F B C, less that of the triangular mass A E F, and is $\frac{1}{2}$. w. F C. F B $-\frac{1}{2}$ w F A. F E. This weight acts vertically through the centre of gravity of the mass A E B C, and cuts the plane B C in the point Q.

2. The resultant pressure P of the retaining wall on the earth, which, by the preceding article, is parallel to the line AE.

3. The reaction R of the plane B C, whose direction makes an angle ϕ with the normal to the plane, and which lies on the side of the normal opposite to that in which the earth would tend to slide.

Since these three forces keep the mass A E B C in equilibrium, they must pass through the same point, *i.e.*, through the point Q, in which the vertical through the centre of gravity of the mass A E B C cuts the plane B C.

If in fig. 3, fb represents the weight of the mass F C B, and fa represents the weight of the mass F A E, then ab will represent the weight of the mass A E B C under consideration.

Draw fc horizontally, and let bc make an angle θ with ba.

In the triangles F C B and fcb, the angle F B C is equal to the angle fbc, since each of them is equal to the angle θ, and since the angles at F and f are right angles, the two triangles F B C and fbc are similar and their sides are proportional.

Now whatever value the angle θ may have, the side F C of the triangle F B C remains constant, and since the side fc of the triangle fbc is proportional to it, this side also is independent of the angle θ and of the value of the weight W, and, therefore, whatever be the length of fb and the magnitude of the angle fbc, the point c remains at a fixed distance from f along the line fc, and is, therefore, a fixed point. Draw the straight line lam. cutting cf produced in the point l, fb in the point a, and making an angle α with the straight line cl; this line will be parallel to A E and to the force P.

From b draw bk, making an angle ϕ with the straight line bc, and cutting the line lm in the point k.

Join ck.

In the triangle abk, the side ab is parallel to and represents W; the side ak is parallel to the force P, and the side bk is parallel to the force R, and therefore the triangle abk is the triangle of force for the equilibrium of the mass A E B C, and the side ak represents the force P to the same scale that the side ab was drawn to represent the weight W.

If we draw a circle through the points c, k, and b, this circle will cut the line ab again in a point b'.

Join cb' and $b'k$.

Then the angle $cb'k$ is equal to the angle θ, the triangle $ab'k$ is the triangle

of force for the equilibrium of the mass A E B C, and the angle $c\,b'\,a$ and the length $a\,b'$ are two corresponding values of θ and W, in the same way that the angle $c\,b\,a$ and the length $a\,b$ are two corresponding values of the same quantities, although the force P, which in both cases is represented by $a\,k$, remains the same. Now it is impossible that corresponding to one value of P, there should be two values of W, and therefore the state of forces described above cannot exist.

Consequently the circle described through the points c, k, and b, must not cut the line $a\,b$ again in a point b', but must only touch the line at b. The circle, then, on which the points c, k, and b lie, is that one through the point c which touches the straight line $a\,b$ at the point b, and cuts $l\,m$ in a point k, such that the angle $c\,b\,k$ is equal to ϕ, the angle of repose of the earth. There is only one circle which fulfils these conditions and it is found thus :—

From the point c draw $c\,m$, cutting the straight line $l\,m$ in the point m, and making an angle ϕ with it.

Bisect $c\,m$ in n, and draw $n\,o$ perpendicular to it.

On $n\,o$ find a point o such that its perpendicular distance from $a\,b$ is equal to $o\,c$ or to $o\,m$. With centre o and radius $o\,c$ describe the circle $c\,b\,m$.

This circle will touch the straight line $a\,b$ at the point b, and will cut the line $l\,m$ in the point k.

Join $c\,k$ and $k\,b$.

Then the angles $c\,m\,k$ and $c\,b\,k$ are in the same segment of the circle $c\,b\,m$, and are therefore equal, and therefore the angle $c\,b\,k$ is equal to the angle ϕ.

The triangle $a\,k\,b$ is the required triangle of force for the equilibrium of the mass A E B C ; the angle $a\,b\,c$ is the required value of the angle θ; and the side $a\,k$ is the required value of the resultant pressure P of the earth on the retaining wall.

Since the point c is fixed for all values of θ we may find its position thus :—

Take any value for θ greater than ϕ, an angle of 45° if possible, then the weight of the mass F B C is equal to $\frac{1}{2}$w F C^2, and that of the mass F A E is equal to $\frac{1}{2}$ w F A. F E.

Draw $f\,b$ (fig. 3) vertically, representing $\frac{1}{2}$w F C^2 to a convenient scale, and $f\,a$ representing $\frac{1}{2}$ w F A. F E. to the same scale.

Draw $f\,c$ horizontally equal to $f\,b$.

Then since $f\,c$ is equal to $f\,b$, the angle $f\,b\,c$ is 45°, and the position of the point c is found for one value of θ, and therefore for any value of θ. The complete construction is as follows :—

Draw $f\,b$ vertical and $f\,c$ horizontal, and make $f\,c$ to represent $\frac{1}{2}$w C F^2 to a convenient scale.

Take $f\,a$ along $f\,b$ equal to $\frac{1}{2}$w F A. F E, and draw $a\,l$ parallel to A E interesting $c\,f$ produced in l.

From c draw $c\,m$, making an angle ϕ with $l\,m$ or $l\,a$ produced.

Bisect $c\,m$ in the point n, and from n draw $n\,o$ perpendicular to $c\,m$.

In $n\,o$ find a point o, such that its perpendicular distance $o\,b$ from $a\,b$ is equal to $o\,c$.

With the point o as centre describe a circle passing through the points c and m, touching the straight line $f\,a\,b$ at the point b, and cutting $l\,m$ at the point k.

Join $c\,k$ and $k\,b$.

Then the length $a\,k$ will represent the required value of the resultant pressure P to the given scale.

As an example : let the height A C of the wall be 8 ft., the vertical height A F of the earth above the top of the wall be 4 ft., the angles α and ϕ be each 30°, and the weight of the earth 90 lbs. per cubic foot.

When θ is 45°, C F is equal to B F, and $c\,f$ is equal to $b\,f$, and therefore to $\frac{1}{2} \times 90 \times 12^2$ lbs.=6,480 lbs. Draw $f\,c$ horizontally to represent 6,480 lbs. to a convenient scale, and draw $f\,b$ vertically through the point f.

The weight of the mass A F E is equal to $\frac{1}{2} \times 90 \times 4 \times 6{\cdot}9$ lbs. = 1,242 lbs. approximately.

From $f\,b$ cut off $f\,a$ representing this 1,242 lbs., and through a draw $l\,a\,m$, cutting $c\,f$ produced in l, and making an angle of 30° with it.

Through c draw $c\,m$ making an angle of 30° with $l\,m$.

Bisect $c\,m$ in n and draw $n\,o$ perpendicular to $c\,m$.

Find a point o in $n\,o$, such that its perpendicular distance from $c\,b$ is equal to $c\,o$, and with o as centre, draw the circle cutting $l\,m$ in a point k, touching $f\,b$ at a point b and passing through the points c and m. Then the distance $a\,k$, which represents 1,420 lbs. approximately, is the required value of P.

To find the point of application of the resultant pressure P, let Q be the point in fig. 2, where the vertical through the centre of gravity of the mass A E B C cuts the plane C B, when C B is drawn making an angle equal to the angle $c\,b\,f$ in fig. 3.

The force P acts through this point Q and if the straight line Q D be drawn parallel to A E, the point D, where it cuts the face A C of the retaining wall, will be the required point of application of the force P.

The point D in this example is approximately $5\frac{2}{3}$ ft. from the top of the wall.

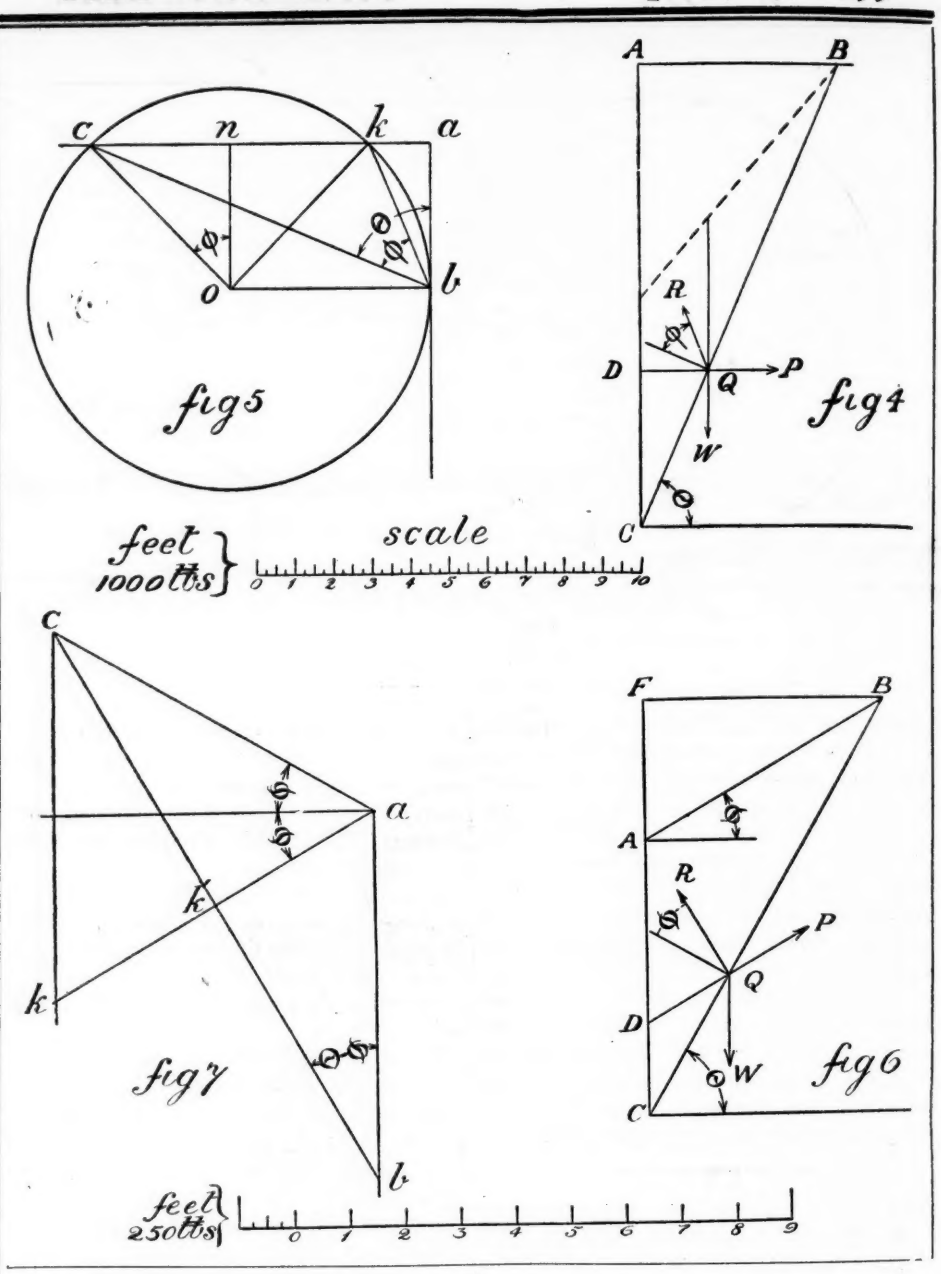
II. Pressure on a retaining wall when the surface of the earth is horizontal and level with the top of the wall.

The earth pressure in this case (see figs. 4 and 5) may be determined from the preceding construction if we place the points k and a on the straight line $f\,c$, make the points f and a coincide, and make the angle α equal to zero. The centre o of the circle which touches the straight line $a\,b$ at the point b, passes through the point c, and cuts the line $a\,c$ again at a point k such that the angle $c\,b\,k$ is equal to ϕ, may be found thus. Through the point c draw a straight line $c\,o$, making an angle ϕ with the vertical.

On $c\,o$ find a point o, such that its perpendicular distance $o\,b$ from $a\,b$ is equal to $o\,c$.

With o as centre describe a circle passing through the point c; this circle will touch the line $a\,b$ at a point b, and cut the line $c\,a$ at a point k. Join $c\,b$, $b\,k$, and $o\,k$, and draw $o\,n$ perpendicular to $a\,c$.

Since the angle $c\,o\,n$ is equal to ϕ, the angle $c\,o\,k$ is equal to $2\,\phi$, and therefore the angle $c\,b\,k$ is equal to ϕ.



The circle $c\,k\,b$ is the one required, and the intercept $a\,k$ on the straight line $a\,c$ represents the required value of the resultant pressure P.

The point D (fig. 4) of application of the force P is situated at a depth of $\frac{2}{3}$ A C from the surface.

As an example, let the height A C of the wall be 12 ft., the angle ϕ be 45°, and the weight of the earth 125 lbs. per cubic foot.

When θ is 45°, C A is equal to A B, and $a\,c$ is equal to $a\,b$, and therefore to $\frac{1}{2}$. 125 . 12^2 lbs. = 9,000 lbs. Draw $a\,c$ (fig. 5) horizontally to represent 9,000 lbs. to a convenient scale, and $a\,b$ vertically through the point a.

From c draw $c\,o$ making an angle ϕ with the vertical, and on $c\,o$ find a point o such that its perpendicular distance $o\,b$ from $a\,b$ is equal to $o\,c$.

With o as centre and $o\,c$ as radius, describe the circle $c\,k\,b$ cutting $a\,c$ in the point k.

Then the distance $a\,k$, which represents 1,500 lbs. approximately, is the required value of P.

The point D in this example is $\frac{2}{3}$ of 12 = 8 ft. from the top of the wall.

III. Pressure on a retaining wall when the surface of the earth is sloped away from the top of the wall to an indefinite distance, and the angle of slope is the angle of repose of the earth.

The construction in case I. is modified to suit this case as follows:—

Draw $a\,b$ (fig. 7) to represent the weight W of the mass A B C in fig. 6, corresponding to any convenient value of θ, and draw $b\,c$ making an angle $(\theta - \phi)$ with $a\,b$.

Through the point a draw $a\,c$, making an angle ϕ with the horizon, and intersecting $b\,c$ in the point c. Draw $a\,k$, making an angle $2\,\phi$ with $a\,c$.

In the triangles A B C and $a\,b\,c$ the angles A B C and B A C are equal to the angles $a\,b\,c$ and $b\,a\,c$, and therefore the side $a\,c$ is proportional to the side A C.

But the side A C is of fixed length independently of the angle θ, and therefore the side $a\,c$ is of fixed length, and the point c is a fixed point, whatever value the angle θ may have.

The value of $a\,c$ is easily found by making the angles A B C and A C B (fig. 6) equal to each other, *i.e.*, by making the angle θ equal to $45° + \frac{\phi}{2}$.

The side $a\,c$ of the triangle $a\,b\,c$ (fig. 7) is then equal to the side $a\,b$, and since $a\,b$ represents the weight of the mass A B C, $a\,c$ is equal to $\frac{1}{2}$ w . A B . p, where p is the perpendicular distance for this value of θ, from the point c on to B A produced.

Since $a\,c$ is of constant length, this value of $a\,c$ is the same for all values of θ.

Let the lines $b\,c$ and $a\,k$ intersect in the point k'. In the triangle $a\,k'\,b$, the side $a\,k'$ is parallel to the force P, the side $a\,b$ is parallel to and represents the weight W, and the side $b\,k'$ is parallel to the force R, and, therefore, the side $a\,k'$ represents the resultant pressure P on the wall.

The correct values of θ and of P are arrived at by the consideration that the retaining wall must resist the thrust of the earth tending to slide down the plane inclined at that angle for which the force P is a maximum.

Now $a\,k'$, and therefore P, increases as the angle $a\,b\,c$ or $(\theta - \phi)$ decreases (in fig. 7) or as the point b recedes from the point a, and therefore since θ must not be less than ϕ, the maximum value occurs when the angle $a\,b\,c$ or $(\theta - \phi)$ is zero, and therefore when $\theta = \phi$.

The line $c\,k'$ is then parallel to the line $a\,b$, and $a\,k'$ is equal to $a\,c$, *i.e.*, to $\frac{1}{2}$. w . A B . p, which is the required value of the force P.

This force is parallel to the line of greatest slope of the surface of the earth, and its point of application D is easily found to be at a distance from A equal to two-thirds the depth of the wall.

As an example, let the height A C of the wall be 5 ft., the angle of repose ϕ be 30°, and the weight of earth be 120 lbs. per cubic foot. Here $\frac{\phi}{2} + 45° = 60°$ and the corresponding value of $a\,b$ (fig. 7), and therefore of $a\,c$, and of the maximum value of P, is equal to $\frac{1}{2} \times 120 \times 5 \times 4\frac{1}{3}$ lbs. = 1,300 lbs. approximately. Also A D = $\frac{2}{3} \times$. A C = $\frac{2}{3} \times 5$ ft. = 3·3 ft.

NOTES.

Archæological Museum at Constantinople.

THE Imperial Ottoman Museum at Constantinople has recently received an important addition. The monument in question is a remarkable bust of the Earth goddess Ge, found at Larkos, in Thessaly. This representation of Ge is unique, it being the only *inscribed* statue of the goddess extant. The inscription is on the pedestal of the bust, and runs as follows:—"To Ge of-all-the-virtues Kaineus son of Peirithous." The head was found apart from the pedestal, but the neck fits exactly. The height of the whole is 0·55 metres. From the character of the inscription the monument cannot be placed earlier than the third century A.D. But, notwithstanding the late date, its value will be at once apparent to all mythologists. Thessaly is known by literary tradition to have been a seat of the worship of the Earth goddess, but till now no monumental evidence existed. Mr. Joubin, who publishes the monument in the *Revue Archéologique* (vol. xxxiv., plate xii.), makes the interesting suggestion that the fashion of sculptural busts may have originated in representations of Ge, who in vase-paintings, terra-cottas, &c., was uniformly represented as half rising from the ground.

American Appreciation of English Work.

IN a recent issue of the *Engineering Record*, a detailed description is given of the cantilever building erected last year at Birmingham, from the designs of Mr. Ralph Heaton. The paper in question remarks that "such devices have reached advanced development in New York," but that examples there "are really only cantilever elements in comparison with the whole cantilever aggregation recently constructed by an English architect." We have already recorded our appreciation of this ingenious architectural work, and it is gratifying to observe that its merits are duly recognised in a country where inventiveness may be termed almost a cardinal virtue. Another of our trans-Atlantic contemporaries announces the adoption for New York harbour, of two sand pump dredgers similar to those used on the Mersey and elsewhere in England. Vessels of this kind take up mud, clay and gravel by a suction pipe, and at Liverpool they have served to materially increase the depth of the channel and to maintain it open over the Mersey bar. Herein is another illustration of the fact that America is fully alive to what takes place in this country, and is by no means unwilling to follow our lead when occasion arises.

Cross-River Communications.

THERE are indications which make it appear likely that the Corporation of Newport may adopt, for the purpose of linking the east and west banks of the River Usk, a means of communication not hitherto tried on a scale of any magnitude in England. Various proposals have been under consideration at Newport since 1896, but the two schemes surviving criticism are (*a*), a subway for foot passengers; and (*b*), a "trans-bordeur" bridge of the type recently erected at Rouen. The respective merits of these alternatives are clearly set forth in a report lately made to the Corporation by Mr. R. H. Haynes, the Borough Engineer. In his plans and estimates for a subway, Mr. Haynes departs from the scheme originally proposed, where access to the tunnel would have been given by vertical shafts 75 ft. deep, and sloping approaches are substituted as tending to obviate the cost of providing and working hydraulic lifts. He estimates the outlay necessary, including lands and easements, at 52,000*l.*, the working cost yearly at 1,321*l.*, and the total annual charge at 3,480*l.* Considering the subway would be 657 yards long, 10 ft. 6 in. diameter, and 75 ft. deep, these figures are by no means excessive. Plans and estimates are also submitted for a bridge similar to that at Rouen. This is virtually a suspension bridge having a railway, on which a trolley runs, 150 ft. above high-water level. From the trolley hangs a platform at quay level, and this is of sufficient size for the conveyance of vehicles and passengers. Any convenient motive power may be utilised for drawing the trolley and platform across the bridge. At Newport the width would be 657 yards, and the time required for crossing one minute. The load of the car, platform, and freight is estimated at 75 tons, but the test load suggested is about 95 tons. Under this, and making due allowance for wind pressure, the total stress on any part of the bridge would not exceed one-fourth the ultimate resistance of the material. The cost of this means of transit is estimated at 60,000*l.*, the annual expenses 1,200*l.*, and the annual charge 4,163*l.* In one respect the subway scheme presents an advantage, as no obstruction to the river front would be offered. On the other hand, the trans-bordeur provides for vehicular traffic, and the time per journey is less than one-fifth of that occupied in walking through the subway. High-level bridges and subways of large size are both considered to be too costly, and a swing bridge would interfere with river traffic. It therefore seems that the kind of aërial ferry we have described is one excellently adapted to the needs of Newport and of many towns similarly situated.

"Intertalk" Telephone System.

TELEPHONE communication between rooms in large buildings is often a great convenience and improvements in the methods adopted are therefore of general interest. The "Intertalk" Telephone System invented by Mr. J. D. F. Andrews is specially adapted for this purpose. This system does away with the necessity for an exchange, and

hence absolute secrecy can be secured. To make a call on a particular room it is simply necessary to press the proper button on the instrument board. On removing the finger the connexions are completed. When the conversation is completed the mere act of hanging up the telephone on its hook replaces the pushes and leaves the instrument in position for a call. Again, by pressing two or more of the buttons at the same time a number of the rooms can be rung up and a message can be sent simultaneously to several departments which in many cases may be a great convenience. The whole of the working parts are mounted on one base, which is placed in the case of the instrument, and hence they can easily be removed and thoroughly inspected at any time. The connexions are simple, and no special knowledge is required for fitting up the "intertalk" telephones. There is an installation of fourteen of these instruments at Dartmouth House, Queen Anne's Gate, which puts into connexion with one another several electrical firms located in the building. The practical working of this installation has given satisfaction to the firms concerned. A similar installation of seventeen of these instruments is in use at Fuller's Confectionery Works at Hammersmith. This building is also wired throughout for the electric light on the well-known concentric wiring system devised by the same inventor.

Water Supply of Aldeburgh.

IT appears that Aldeburgh has an inadequate and unsatisfactory water supply, and Dr. Deane Sweeting's Report on the subject to the Local Government Board is an interesting document throwing light on rather a curious state of things. It appears that the provision for water supply at Aldeburgh consists of a collecting reservoir capable of containing about 88,000 gallons, and a filtration chamber of rather primitive construction. When the level of the reservoir is within 18 in. of the bottom, pumping is resorted to until the tank is again full.

"The collecting reservoir is said to be never emptied by the pumping that is practised. But I learned that, during the construction of the pumping well, this reservoir was on one occasion entirely emptied by twenty minutes' continuous working of a 6-in. portable centrifugal pump. Since, therefore, this reservoir holds, at its maximum, some 88,000 gallons, and since some 1,700 people habitually consume the water, its maximum contents are equal to less than two days' consumption (at thirty gallons per head per day). When, as during the summer season, visitors to Aldeburgh double the population, pumping must—seeing that the service tank holds only some 10,000 gallons—be frequently resorted to. At such times it is highly probable that the collecting reservoir must be pumped to exhaustion, unless, of course, the pumping well receives much soil water directly through its pervious walls."

The last sentence is the important part in this quotation. The water is said to be pumped from springs, but Dr. Sweeting, in a statement too long to follow in detail, makes it apparent that a good deal of the water pumped into the reservoir is abstracted from a porous shingle which is also full of ill-constructed cess-pools, and that the inhabitants of Aldeburgh are in reality deluded into drinking their own diluted sewage, with exceedingly inefficient filtration. If so, Aldeburgh is a place to be avoided until the water supply has been thoroughly reformed on a sanitary basis.

"Skeleton" and "Cage" Construction.

A TABLET affixed early last month, by the Society of Architectural Iron Manufacturers, to the Tower Building in New York, states the structure to be "the earliest example of skeleton building in which the entire weight of the walls and floors is borne and transmitted to the foundations by a framework of metal posts and beams." Some printed slips containing a historical sketch of early skeleton buildings were distributed at the unveiling of the tablet. In this sketch, skeleton construction is stated to consist of a framework of columns and girders carrying the weight of the outer walls and of the floors to the foundations, whilst cage framework is said to carry the floors, but not the walls, which sustain their own weight. It has been suggested, however, that these definitions are exactly converse to those usually accepted, and that the one form of construction may be likened to an animal skeleton, and the other to a bird-cage. Comparisons are sometimes inadvisable, and it is not altogether improbable that a reply may be made suggesting that, although the skeleton in a living animal derives some support from covering tissues, the entire weight is nevertheless transmitted through the feet to the earth. Similarly, it may be argued that a cage of any kind, although possessed of strength sufficient for the support of its various parts, including the floor, is not usually designed for carrying solid sides, or any extraneous load of a similar kind. Technical nomenclature is largely of anatomical origin, and so far only approximately appropriate. Variations of opinion are therefore sure to occur; but, as uniformity of expression is always desirable, it is well that any differences, such as the one we have mentioned, should be promptly adjusted.

School Ventilation in America.

A GOOD deal is occasionally heard as to the perfection of arrangements adopted in the United States for the ventilation and warming of schools and other public buildings. Judging from a recent report to the American Society of Heating and Ventilating Engineers, by Mr. John Gormley, of Philadelphia, opinion in America on this important point is not invariably of so favourable a nature. Philadelphia may be taken as a fairly representative city, for it has over 2,400,000*l.* invested in school property, 153,000 pupils in the public schools, 40,000 pupils in the parish schools of one denomination, besides those in the establishments of other denominations. These figures show that opportunities for examination and comment are not wanting. Mr. Gormley has taken advantage of his opportunities, and his comments are not entirely complimentary. In many schools erected prior to 1870 no provision whatever has been made for ventilation, which can only be effected by lowering the upper window sashes. This seems to be a general practice in Philadelphia, where there is a law compelling attendance, but none compelling ventilation. Where fan systems are used, from 24 to 30 cubic feet of air are supplied per pupil per minute, and with ordinary indirect steam and hot-air plants 10 cubic feet of air are given per pupil per minute. As the quantity of fresh air necessary to keep down the proportion of CO_2 to 8 parts per 10,000 is 33 cubic feet per head per minute, none of these systems can be said to err on the side of safety. In no case are intake shafts to be observed drawing air from purer strata above the roof; devices for air filtration are seldom, if ever, used. Evaporating pans for the provision of moisture are invariably found dry, and unprovided with automatic feeding arrangements. In several places where fans are driven by gas engines complaints are made of escaping gas, of the smell of hot oil and of noise and vibration. In fan-heated schools, where modern apparatus has been installed, much more satisfactory results are found to be achieved, and it would therefore appear that managing bodies rather than ventilating engineers are to be blamed for the unsatisfactory state of things at present existing. Possibly some of the defects in the older buildings may arise from the installation of heating apparatus for which no proper accommodation exists. Where additions or alterations of this kind are being made it is always to be desired that an architect should confer with the ventilating engineer, so that structural conditions may be properly considered.

The South Sea House, Threadneedle-street.

WE read that the freehold premises have been bought for 350,000*l.*, being at the rate of 45*l.* 10s. 2d. per square foot, and will be demolished to make room for a warehouse to be erected by the British Linen Company. The South Sea Company was originated by Edward Harley, Earl of Oxford, and Sir John Blunt in 1711 for the discharge of nearly ten millions of public debt; in return the stock-holders were granted, in 1720, a monopoly of trade to the South Seas and the mines of Spanish America. The original office, known as the "Old South Sea House," stood in Old Broad-street; its site was afterwards taken for the City Club, built in 1833, from the designs of Philip Hardwick, R.A.

SANITARY EXHIBITION AT SOUTHAMPTON.

THE Sanitary Exhibition has become the theatre where the fortunes of the dangerous bacillus and the friendly microbe are displayed. The subject was touched on by Mr. James Lemon in his recent address before the "Engineering and Architecture" Section of the Congress. He was able to state that medical officers, chemists, and engineers were no longer in opposite camps. They are agreed that the great sludge system, whereon London and many large towns have expended so much money, and also the rustic simplicity of the sewage-farm, are a mistake, while they are united in the belief that it is from some arrangement or other of the bacterial filter-bed that salvation is likely to spring. We are, in fact, just beginning to apply the discovery that the bacterial house is divided against itself. There is germ life which is favourable to healthy organism, just as there is germ life which is hostile to it, and, given favourable conditions, it is the good which will conquer and the bad will be destroyed. When, however, we leave the general truth, and attend to the best methods for its application, we are likely to meet with differences of opinion, and also, which makes these differences the more acute, with conflicting interests.

There are working models of three modifications of the bacterial filter-bed at the Exhibition, viz., "the Septic Tank System," "Candy's System of Bacterial Sewage Purification," and that of "the International Purification Syndicate." We shall better understand the claims put forward on behalf of these systems by their proprietors, when the principle which underlies all sewage purification is clear. This consists in a chemical change which the sewage undergoes, during which it is broken up into its

component parts, while these form again into fresh combinations. If sufficient air has access to the sewage, the nitrogen takes oxygen to form nitric acid, and this, combining with the bases, forms soluble nitrates, while the carbon in a similar way forms carbonic acid and carbonates. This decomposition is brought about, whether in the earth, air, or water, by minute fungoid organisms, the growth of which has the effect of resolving the complex organic compounds into these soluble salts or gaseous bodies. What is to be aimed at, therefore, in any system, is to provide the sewage with the means for obtaining oxygen from the air, and so effect the changes of which we have spoken.

It is necessary, in the first place, to get rid of solid matter, since it is obvious that while it retains this form the surface alone can undergo change, a process too gradual for working purposes. To effect this, the sewage must pass into a tank of sufficient size to give the solids time to liquify to a greater or less extent by the process of fermentation. In the size of this tank lies the first difference between the rival methods we have named. The "septic" tank is of sufficient size to make the solids to entirely disappear in the gradual transit of the sewage through the length of the chamber, which is air-tight, a material condition, according to its inventors, to effect a rapid and complete digestion of the solids. This receptacle, in the instance of the other system (for the other two are identical except as to the filtrating material) partakes more of the nature of a catch-pit, and is not looked upon by its inventors as performing any vital part in the process. With them, what we may suppose to be the semi-liquefied sewage is distributed over a filter-bed composed of large pieces of material, as bricks or ballast. In this bed it leaves the more solid matter distributed over the bricks or stones through which it has passed, and reaches a further filter-bed in a liquefied state. It is claimed that this bed, offering a greater surface than a simple tank can present, and being also worked under anaërobic conditions, the same results are attained. Whether or no, we cannot help thinking that this part of the process is best conducted in a closed chamber. Where solids are dealt with or any sewage under anaërobic conditions, there is deoxidation and putrefaction, and "where there is putrefaction," as Dr. Poore tersely puts it, "there is stink." Indeed, in the "Candy's System" it is admitted, in the explanatory pamphlet issued, that unpleasantly smelling gases will in time be produced if the sewage be "strong." The inherent function of this first treatment, we should say, is that the sewage should be absolutely liquefied and also sufficiently diluted. Bacteria which will thrive after their normal solid food has been taken from them, will perish when the infusion becomes dilute. Supposing the liquefaction and dilution to be complete, whether performed in a tank or in a water-logged filter-bed—both more or less under anaërobic conditions—the next thing is to give the sewage opportunities of nitrification in a filter-bed composed of small material, gas-breeze being the most usual. In the "Septic Tank" system the liquid sewage is admitted from below until the filter-bed is covered, and there it remains for a length of time sufficient for it to deposit its impurities in the shape of films upon the material of the filter-bed. By an automatic arrangement, this bed is emptied, while at the same time another one is brought into action. The number of these filter-beds depends upon the quantity of sewage to be treated, and being taken in succession, a period of rest is provided them during which the more complete decomposition of deposits is effected. It is during these rests that the aërobic properties of the filter principally come into play, although such a material as breeze holds naturally a great quantity of air between its particles.

In the Candy's system it is pointed out that this process is wholly aërobic, since the liquid sewage is distributed over the surface of the filter by means of an automatic sprinkler, consequently the filter becomes at no time water-logged, and requires no rests. The "Purification Syndicate" employ a material for filtration which they call "Polarite," being "a magnetic oxide of iron in a minutely porous and absorptive condition." This, it is stated, possesses such active filtering properties that it enables the filtration chambers to be built of much smaller dimensions, whereby the cost of installation is decreased.

Those who are responsible for these methods of sewage treatment declare that the processes we have described are sufficient, and that the effluent is practically colourless, odourless, and tasteless. We have had an opportunity of seeing the results obtained by the "Septic Tank" process, where it has been experimentally tried upon a section of the sewage system of Exeter, and we admit that the sample taken in our presence did quite reasonably fulfil the first two at least of these results. The Local Government Board, however, we understand, still stand out, in all cases, for a further process of distribution over the land, and are unwilling to grant loans without this condition being satisfied.

This additional process is, of course, useless unless sufficient land is taken in for the purpose, and the soil be of the right quality, two items which represent an increased expenditure and possible difficulties. If the land soil becomes soaked, no decomposing action takes place; and if the nature of the soil is stiff, a negative result is also obtained. But the vegetable mould on the surface of the earth is a filter of a very perfect kind, and teems with saprophytic bacteria, while the subsoil is barren of all kinds of life. The surface of the ground, therefore, being only of value, a sufficient area is important. Attempts have been made to isolate this nitrifying organism with some success, and a "bacillo-coccus" has been identified as producing nitrification in a remarkable degree. There are fungi, too, of a higher class, which are also active in the work of disintegration and oxidation, while the organisms which flourish in the human body cease to multiply under their altered conditions, and fall easy victims to the attacks of the native.

We shall soon be enabled to judge whether the bacterial filter performs the necessary work in a satisfactory manner, as different variations of the system are being adopted by several corporations. If it be desirable to add the further process of distribution over the land, experience will demonstrate the fact, although, as we have shown, its employment will be attended with many disabilities. But so far as the treatment has developed itself, the results may certainly be spoken of as gratifying. The sludge has been got rid of, and sludge has proved a continual stumbling block. With the sludge, too, have vanished disinfectants, those short cuts to perfection which are the longest in the end. Once disinfect sewage by any of the ordinary prescriptions, and though you may have reduced its powers of offence, you have sterilised it and rendered nitrification impossible.

The "Septic Tank" Company have also a modification of their system on view for treating the sewage of an ordinary house. Where any house is already in possession of a watertight cesspit, in which the solid material is broken up and digested, and the overflow from this disperses the liquid sewage over a sufficient area of suitable land, it may be said that all the aërobic requirements of a filter-bed are satisfied. But where these conditions cannot be satisfactorily employed the "Septic Tank" modification should be simple and effective.

Among the exhibitions of sanitary fittings, one is agreeably struck by the predominance of the plain white ware and white enamels in sinks, water-closets and baths. It may be that in giving up the employment of ornament, the present decorative fashion for white surfaces is being followed. Nothing can at least be more suitable. Perhaps there is nothing that is absolutely new to be described. The double-action siphonic closet of Messrs. Jennings has been out for some years, a form of closet that certainly tells where the water companies impose too strict a limit upon the amount of water used, for the suction set up is sufficient to entirely clear the pan of all débris. They also have a new aluminium flap for inlet ventilators to drains, which resists the destructive effects of weather and gases.

Messrs. Shanks exhibit their "Compactum" closet, which has the advantage of being the most noiseless form of "wash-down" apparatus we know. The Sanitary Lead Lining Company show samples of their lead-lined iron pipes, which, besides the advantages they offer in the way of protection from corrosion from within and accidental injury from without, can, by turning the lead lining back over the iron at the joints, be wiped in the usual way, so avoiding the use of thimbles, which have to be called into requisition when iron pipes alone are employed. "Anderson's Patent Coupling" is also an ingenious device for connecting either two lead pipes, or lead to iron, whereby a wiped joint or thimble is avoided, and a saving at the same time it is declared is made in the cost. In the groups of filters, when we place the Berkefeld filter in the front as being the most reliable, if not the only reliable pattern, we are giving an opinion formed after much inquiry. Among the minor exhibits is a small nozzle for placing on the mouth of a tap to avoid splashing. What it effects is very curious, the water descending in a straight column as though its specific gravity had been increased, and meeting any substance placed at a distance beneath it without any trace of recoil.

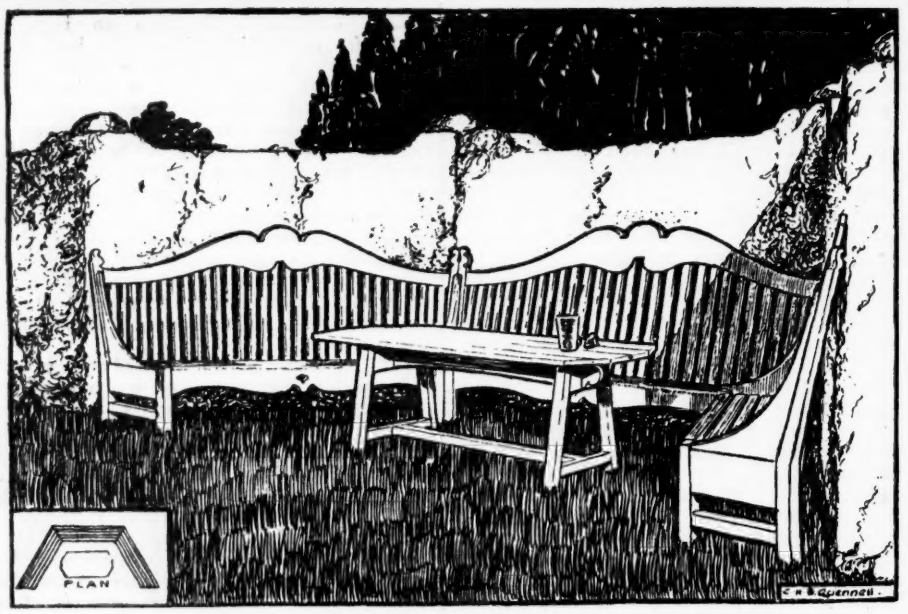
What we stand most in need of at the present moment, however, is not so much a greater perfection in sanitary appliances as a more general adoption of the improvements which have been already made. In many of our provincial towns we have not got beyond the modest requirements of the Public Health Act of 1875. Even where improved methods are employed, they are often carried out in so ignorant and unworkmanlike a manner as to aggravate the causes of offence rather than remove them. Perhaps no one of these improvements is so much in vogue as the inspection chamber. Yet when these are ill-constructed, they violate more than anything else the chief canon of good drainage—viz., that it shall be self-cleansing. The drain which is uninterrupted, even though it cannot be got at, is readily flushed. But an inspection-chamber that is ill-built is capable of fouling the whole system by becoming a cesspool. When the sewer is at a considerable depth, the speculative builder, that he may save on the digging, will discharge his junctions into a chamber several feet above the channel bottom, and these scatter their refuse upon the walls and floor of the pit, where it remains. Or take the instance of the pedestal closet. One is glad to see the last of the old iron container and D trap upon almost any terms. But the seal to many of the cheaper patterns of wash-downs and wash-outs is so shallow as to render their traps of no service whatever. The lead soil pipe has been turned out of the house, but a light iron one, the joints of which gape through the red lead, has replaced it outside. Yet for a trifling expense a heavy pipe might be employed, with joints caulked in lead and the interior either galvanised or treated by the "Angus Smith" process, and, although three tiers of water-closets may be connected with it, it is furnished with no anti-siphonage pipes.

Still, it is by such exhibitions as these that public interest is gradually aroused; and public interest, curiously enough, when concerned upon its own affairs, is a very slow-moving influence.

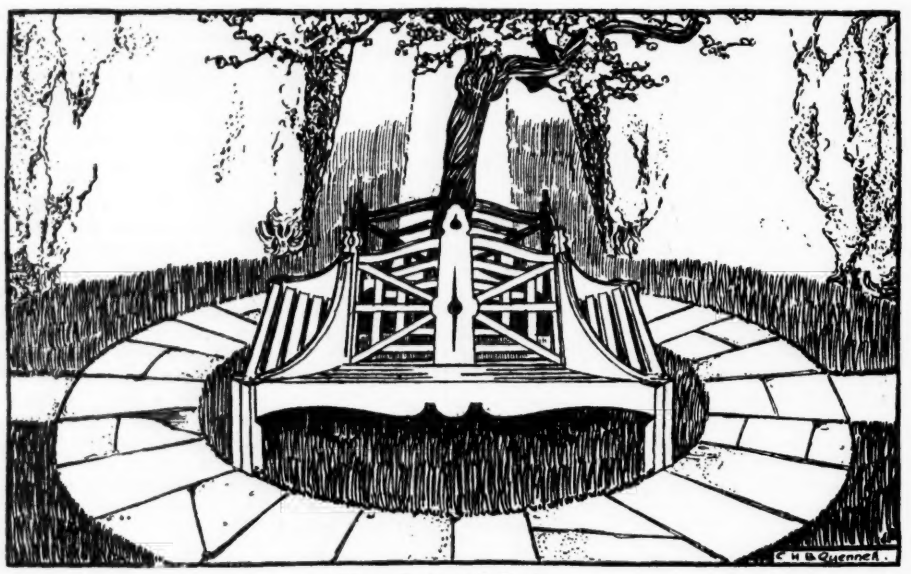
COMPETITIONS.

THE NEW MARKET HALL FOR LEEDS.—The first premiated design in this competition is by Messrs. Leeming & Leeming, architects, Victoria House, 117, Victoria-street, Westminster, S.W. The estimated cost is 73,000*l.* The second (which would require an outlay of 55,000*l.*) is by Mr. Walter Hanstock, of Leeds and Batley; and the third premium falls to Mr. Bowman, of Greek-street, Leeds, who estimates the cost of carrying out his plans at 43,000*l.* It is stated that the Markets Committee have not yet definitely decided which set of plans they will finally adopt for the structure. All they have done is to confirm the decision of the President of the Royal Institute of British Architects as to the allocation of the three premiums of 150*l.*, 100*l.*, and 50*l.* respectively. The area of the site on which the hall is to be built is 4,560 square yards.

ARCHITECTURAL ASSOCIATION OF IRELAND.—On Saturday last a large party of the members of this Association visited Powerscourt House, Enniskerry, where they were received by Lord Powerscourt, who conducted them over the house and beautiful gardens, with the magnificent terraces designed by Mr. Penrose. The house is a fine old Georgian mansion designed by Cassells, an architect who flourished about 1780 and who is known chiefly as the designer of the Houses of Parliament, Leinster House, and the dining hall of Trinity College, Dublin. The house contains a fine collection of pictures and other art treasures collected by the present and former Lords Powerscourt during travels in many lands.



The "Pyghtle Design.



The "Bedford" Design.

DESIGNS FOR GARDEN SEATS.

THE two garden seats here illustrated are made by Mr. J. P. White, of the Pyghtle Works, Bedford, from the design of Mr. Quennell. They are good examples of garden benches of simple construction and designed on artistic lines.

THE SANITARY INSTITUTE CONGRESS, SOUTHAMPTON.

(Continued rom page 218.)

IN his paper on "Unhealthy Areas and Municipal Re-housing," read before the Conference of Municipal Representatives, the author, Mr. Thomas Blashill, said that the re-housing problem now before municipal bodies was not the same thing as that housing problem which was so often said to be the question of the hour. The question of rehousing, so far as necessary, persons dwelling upon insanitary areas, in houses unfit for human habitation—an obligation placed upon the Local Authority under the existing law—was a formidable obstacle to the improvement of such areas, and the most strenuous efforts to cope with it, even at unstinted cost, had, so far as the author was aware, failed to secure the results demanded by Parliament and public sentiment. If the author's experience as the Architect to the Metropolitan Board of Works and the London County Council had afforded him special opportunities for studying this question, his recent retirement freed him to deal with it impartially. They all knew the kind of districts which were curtly but expressively known as "slums." Insanitary areas must, under the Act, not merely have serious sanitary defects, but defects which cannot be remedied otherwise than by an improvement scheme. These areas must not be merely overcrowded by miserable populations but be unfit for human habitation. Unless this phrase could be rightly applied, and in the sense intended by Parliament, defects existing ought to be dealt with house by house under ordinary sanitary laws, although for this purpose they required to be considerably strengthened and more rigidly enforced. But if defects existed, which could not be remidied without an improvement scheme, such exceptional measures as would produce the effectual remedy contemplated by the Act, were fully justified. The repeated references throughout the Act of 1890, to the persons displaced, showed that Parliament contemplated the rehousing of the very persons found living upon the area. Provision for a similar number to those displaced could not be (as often assumed) a compliance with the Act. During the long period required for the completion of an improvement scheme the people turned out are usually dispersed—the mischief is done. The new comers, probably of a different class who have never lived in slums and who may be new to the neighbourhood, or even new to the town, cannot be said to make room elsewhere for persons displaced two years before, or in any way to mitigate the evils foreseen by the legislature. Clearly, therefore, an improvement scheme should include the provision of reasonable accommodation for the persons turned out. It might be that in some provincial towns, as in Liverpool, re-housing had been more successfully carried out than in London, but a statement of the money expended under the Housing Acts in the Metropolis would be instructive. Unlike the Metropolitan Board of Works, which disposed of its cleared areas to public companies, its successor, the London County Council, had itself undertaken the duty of providing dwellings, and while the great bulk of the work had been done through its own architect, enough for comparison had been done by specially experienced private architects. From 1876 to the end of 1898 the Board and the Council had spent, or were pledged to spend, 2,835,227*l.*, while the receipts, actual and estimated, would amount to no more than 668,860*l.*, the deficiency being 2,166,367*l.* Accommodation had been provided for a few hundreds more than the 39,207 persons displaced, and the net cost had been 55*l.* per head of the persons removed. Making allowance for the return due to street improvements, the net loss would still be 45*l.* or, perhaps, 50*l.* for every person displaced. An enquiry made some two years ago showed that an extremely small proportion of the persons displaced found their way back to the new buildings put up on the old site; hence it was clear that practically 33,000 or more of the persons displaced had gone to other districts and there reproduced the overcrowding which it had been the public object to prevent. In the formation ot a scheme the Government demands provision, out of the rents, of a sinking fund to replace the new buildings in sixty years, when 100 years would seem to be more reasonable. It also demands that the cost of land shall be replaced in the same period, though no outsider can see why this should be replaced at all. When you have satisfied the demands of the Home Office, the Local Government Board, the Public Health Act, the Building Acts, and the by-laws—even when you have silenced the critic (were such a thing possible)—when the dwellings are ready for occupation, then, said the author of the paper, your troubles begin. If any of the old slum-dwellers find their way back, everything is new and therefore distasteful. The cooking arrangements are beyond them. They have never before been forced to keep their dwellings clean, and you must preach what is to them a new gospel—the gospel of health. To tell the family of six accustomed to live in one room, that they must take three rooms and pay three shillings a week more rent, settles the busines. They have not got the money, and if they had they would not spend it in that way. Having already heavily taxed your ratepayer, how can you go to him again for the money to rehouse such people in costly habitable dwellings at their former rent? These people must go away, and the new dwellings must be let to new tenants who can pay a rent that will provide for your interest and your sinking fund. Such considerations as these had brought him to the conclusion that an Act so costly which fails to carry out its own objects ought to be replaced by new legislation. Let the whole question be considered afresh, he said, in order to discover what would be a strictly fair arrangement, but for the trammels created by former Acts.

Mr. Blashill then suggested the main lines of a scheme for the formation of Improvement Trusts. Upon the issue of an order declaring an area to be unfit for habitation, the freeholders should be directed to form a Trust for the improvement of the property. The Trust would acquire, through an official arbitrator, all leasehold interests at their fair value under all the actual circumstances.

The inhabitants would enjoy fixity of tenure on payment of rent until the Local Authority could get them settled elsewhere. No new inhabitants would be permitted to enter upon the area. Under the supervision of the Local Authority and the Government Department the Trust would acquire any adjoining property absolutely necessary for the improvement of the area, as such property is acquired now.

When all this had been done and the inhabitants had been removed, the Trust would demolish the houses, widen the streets, and make the property marketable without any restriction as to its purpose, and without any sacrifice of its value. This value, at present lost, would enable the owner to carry out the improvement. Its retention forms the backbone of this scheme.

Every family would be scheduled, and it would be seen which of them must be rehoused on or near to the site, which might settle beyond a radius of a mile and a quarter, and which might be accommodated in the outskirts. A certain number might have to be compensated for travelling. A family of six that had occupied a single room at 5s. 6d. a week would be put into a tenement of three rooms further away at 8s. 6d., the extra 3s. being allowed as compensation by the Local Authority (who up to this point had not been called upon to pay anything); but this expense

would probably not amount to one-fourth the present expenditure on schemes which do not re-house. In conclusion, Mr. Blashill said he brought forward the scheme as a practical, economical, and expeditious substitute for the Housing Act of 1890, which was costly and dilatory, and wholly inefficient in respect of the re-housing of persons displaced.

Major Lamorock Flower, in the discussion which followed, proposed a vote of thanks to Mr. Blashill.

Councillor Womersley (Chairman Health Committee, Leeds) seconded the motion, which was agreed to. At Leeds they had taken over an insanitary area of 16 acres, which they had divided into four portions. They had attempted to deal with one quarter of the scheme, and he was not sure they would touch any more. They were building houses which could not be let at less than 6s. 6d. per week for people who now paid only 3s. 6d. The remedies proposed under the Act did not meet such cases. The Local Government Board said they ought to move up. They were endeavouring to do so; but, for his own part, he did not think they were getting a sufficient return at present for their large expenditure.

The vote was unanimously carried.

Mr. Alderman Purcell (Liverpool) said that when they woke up to the fact that they had 14,000 or 15,000 insanitary houses in Liverpool inhabited by some 70,000 people they knew they had a very serious problem to face. They could not turn out 70,000 people at once, and they went to Parliament to get an Act of their own. They bought the insanitary houses, and land where necessary, rebuilding them at the rate of about 500 a year, but they soon found that these houses did not meet the requirements of the people displaced because of their high price. They set to work again on other plans, and built a series of houses to let at from 1s. to 1s. 2d. per room. The Local Government Board demurred, but ultimately they got their own way.

Councillor Welch (Eastbourne) asked whether it was not preferable to erect artisans' dwellings by private enterprise, which he thought far better than doing it in muuicipal undertakings?

Alderman Bartlett (Liverpool) explained that their experiences in Liverpool had been acquired under the private Act of 1864, which did not give power to purchase land except in the ordinary way. As an experiment, the Liverpool scheme had answered very well. At first they had a return of 4¼ per cent., and he thought they might reckon permanently on 4 per cent. A self-supporting scheme would mean in most cases, under the Act of 1890, a return of 6 per cent., and they could not expect persons who had lived in slums to pay 6 per cent. on the expenditure, in such schemes. They must make up the difference. Where they had to rehouse people of the lowest class, they must put some burden on the rates. Without that he thought they would never solve the problem. Alderman Bartlett, in reference to Mr. Hair's description of the artisans' dwellings at Southampton, expressed surprise that any Corporation should consider it its duty to provide houses for people who could pay a rent of 7s. a week—such people must be earning 30s., 40s., or 50s. a week.

Mr. Hair, in responding to a vote of thanks, briefly answered most of the points raised.

Dr. Ch. Porter (M.O.H., Stockport), in the next paper, advocated the "Annual Licensing of Common Lodging-Houses," arguing so cogently in favour of his proposal that the Conference adopted unanimously the author's opinion that licences granted to common lodging-houses should be subject to revision annually.

Joint Committees for Watershed Areas.

Major Lamorock Flower, Engineer to the Lea Conservancy Board, next read a paper recommending the "Establishment of Joint Committees for Watershed Areas." Major Flower had repeatedly brought this subject before sanitarians from 1876, when he introduced it at a conference presided over by the Prince of Wales on the Health and Sewage of Towns. His Board (the Lea Conservancy) was the first public body to be entrusted with the care of an entire watershed. The principle contended for in the paper was adopted in Sir F. Powell's "Rivers Pollution Bill," and has been powerfully advocated by sanitarians, particularly in a strong paper read at the Birmingham Congress last year by Dr. C. Childs, delegate of Oxford University, and one by Mr. R. E. Middleton, read before the Sanitary Institute. According to the latter authority seventy-eight towns or villages situated in fifteen counties, and controlled by over 2,000 authorities, polluted the Thames or its tributaries. The best results had followed the establishment of control by one authority, the Thames Conservators. A recommendation in favour of the principle contended for in the paper being considered by the Council of the Sanitary Institute, with the object of furthering Major Flower's proposal, was unanimously adopted by the conference.

The concluding paper on the day's programme was a paper by Mr. E. A. Brayley Hodgetts, entitled "Smoke Abatement." Owing to the allotted time of the meeting having nearly elapsed, the author curtailed his paper, which, on the whole, went to show that the smoke nuisance tended to depopulate the towns, and drive people to districts where they could breathe purer atmosphere. The object of the paper was upheld by one or two speakers, and shortly after two o'clock the assembly dispersed, after a vote of thanks had been accorded to Alderman Walton, on the motion of Dr. Finny, Mayor of Kingston.

CONFERENCE OF MUNICIPAL ENGINEERS AND SURVEYORS.

This conference was one of the most numerously attended of those held in Hartley College. Mr. E. P. Hooley (County Surveyor, Notts), presided, and Mr. E. G. Mawbey (Borough Engineer, Leicester) was the Recording Secretary.

The President, in his inaugural address, referred to "Some of the Difficulties of Public Life," with special reference to the position of surveyor under County or other Councils. Mr. Hooley painted in rather lugubrious colours the condition of the aspirant to public office, certain types of members of Councils being freely treated. In reference to salaries, the President said the majority of salaries on which a surveyor is supposed to live, clothe, and keep himself honest is 150*l.* per annum; and lucky is the man who finds he is able to keep single until his prospects are more settled. After a few years of waiting, whilst possibly his district has doubled itself in size, and he has worked as he probably never will again, his salary is grumblingly increased to 200*l.* per year, and at thirty-five he may possibly be in receipt of 350*l.* per annum. The early worry, the anxious and everlasting strain that a young man has to go through, weakens too often his constitution, and makes him unfitted to sustain a severe illness, and this is the cause of the many, many early collapses our Association of Municipal and County Engineers has to record.

The author, as a remedy, could only suggest that the Local Government Board should accept the Surveyor on the same footing as the Medical Officer of Health, and so at any rate prevent his being dismissed at the caprice of those over him without any court of appeal, and then with superannuation in front and security of office at hand his lot would be happier and his mind freer to combat with his daily duties and professional worries.

Mr. Alderman Lemon (ex-Mayor of Southampton) moved the usual vote of thanks, and in the course of a brief address, he read a letter he had received from Mr. Lewis Angell, late Borough Engineer of West Ham, upon which he hoped the Conference would permit him to found a further motion. The letter referred to the action of the Socialist majority of the West Ham Town Council in having "cleared out their contractors, doing their own work, putting officials of their own views over them, and refusing to pension off their old officers."

The vote of thanks to the president having been previously carried, Alderman Lemon then moved:—

"That this Conference of Municipal and County Engineers strongly protests against the disgraceful conduct of the Town Council of West Ham in summarily dismissing the Borough Engineer, Mr. L. Angell, without cause or reason, after thirty-two years' service."

The resolution having been seconded, was put and carried unanimously.

The recording secretary was directed to forward to the West Ham Town Council and to the Local Government Board copies of this resolution.

Sewage Works, Southampton.

Mr. W. B. G. Bennett (Borough Engineer of Southampton) then read a paper on "The New Sewerage and Sewage Disposal Works of the Borough of Southampton." The town and certain rural districts beyond had, he said, been constituted a county at a very remote period, its first charter being granted by Henry II. and confirmed by King John. The old borough which occupied a triangular spit of land between the rivers Itchen and Test, had been extended in 1895 from an area of 2,004 acres to one of 4,417 acres exclusive of mud lands. The population in 1600 was only 3,000, in 1831 it was 19,324, living in 3,562 houses, and now exceeded 100,000 living in 22,000 houses. Every year adds 800 new houses to the number.

The sanitary improvements, which include main sewerage and sewage disposal works, commenced at Corporation Wharf, in 1896, are partially in operation, and are rapidly approaching completion. The portions completed and those still under construction were shown on maps and diagrams. They affect about two-thirds of the area and 85,000 of the population. The precipitation tanks at the sewage disposal works, nine in number (of which six are completed), have a total capacity of 1,099,000 gallons. The level permits discharge on the ebb tide after chemical precipitation. A number of details were then given of the sewage disposal works, which were afterwards visited by the members of the Congress. A street refuse destructor in use for fifteen years has been supplemented from time to time by additional cells, and the author points out that they have effected a great saving financially, as compared with the working of fifteen years ago, but there are times when recourse must be had to outside fuel if the works are to be kept constantly going.

The maximum quantity of sewage lifted from the districts at present discharging into the wells has reached 2,781,000 gallons in twenty-four hours. For the diversion of the sewage to the new disposal works, and other reasons, twenty-five miles of new sewers and storm-water drains have been constructed of various descriptions and dimensions. The main intercepting sewers follow nearly the line of contour round the eastern, southern, and western fronts of the town, a situation which renders certain the interception of all sewers falling towards the water, and the disconnexion and abandonment of the old outfalls.

The Borough Engineer ended by stating his conclusion, arrived at by his experiments at these works, that with refuse it was possible to provide not only sufficient for driving the machinery in connexion with the sewerage system of certain districts, but also to effectually treat the sewage.

A vote of thanks was accorded to Mr. Bennett on the motion of Mr. Morgan (Weymouth), his predecessor as assistant-engineer when Mr. Lemon held the chief post. His experience was that tide-locked sewers and heavy rains did not go well together. On coming to Southampton on the previous Friday he smelt his friend the western shore. The smells arose from decomposed seaweed and animal matter blown up by the winds, and as the evenings cooled it was only natural that the foul gases should be drifted over the town. They would never improve the smells arising from the Test until the whole of the western shore was reclaimed.

Mr. Mawbey (Leicester) expressed satisfaction at the extensive and sound character of the advice on sanitary matters given to the town of Southampton.

Baillie Anderson (Glasgow) had come to Southampton specially to see the works in course of construction, and to convey back, if possible, some improvement that might be applicable in Glasgow, where they suffered under great difficulties. They had to deal with from ten to twelve millions of gallons of sewage in hot weather, and from twelve to fourteen millions during a rainfall. A large expenditure in dealing with the matter was in contemplation, and their scheme might probably cost them 1,250,000*l.* before they completed it.

Mr. Munce (Belfast) having referred to the smell caused by decaying seaweed,

The President brought the discussion to a close.

Mr. Bennett, in responding to a cordial vote of thanks which had been given, replied to various points raised. It was at the suggestion

of Mr. Lemon that their tanks were made to discharge eight times every twenty-four hours. In reply to Mr. Gloyne (Eastbourne), he said the chemical treatment was as yet only in its experimental stage. The height and fall of the tide was about 14 ft. to 15 ft. A very little leakage had been discovered in the compression of the air from the house to the ejectors. The sewers were egg-shaped, and so constructed that they had a self-cleansing flow. There was very little gas found in them. In regard to the question of ventilation that was now under the consideration of the County Borough Council.

Mr. T. Hunt (engineer and surveyor, Dorchester) read a paper on "The Provision and Laying-out of Public Pleasure Grounds."

Mr. Thomas Henry (surveyor, Retford) read a paper on "Drainage and Water Supply in Rural Districts." The paper was the outcome of the writer's efforts to spread sanitary ideas among some of the poorer classes in the rural districts. Much of his business lay in coping with the unsanitary dwellings of the labourers. They were, he said, the people who formed the least desirable tenants, and who looked upon the sanitary engineer as a meddler. There were among them individuals who would sooner use the antediluvian methods of sanitation than conform to modern and improved ideas.

After a brief acknowledgment by the President of a vote of thanks accorded to him, he invited the members of the Conference to lunch with him.

SANITARY INSPECTORS' CONFERENCE.

This Conference, over which Mr. Charles MacMahon, Chief Sanitary Inspector, Torquay, presided, was also very numerously attended.

In his opening address the leading points taken up were the "hindrances to sanitary efficiency." The first hindrance to the zealous and fearless performance of the varied and frequently unpleasant duties of the sanitary inspector was insecurity of tenure of the office he held. A few enlightened authorities had extended to three or five years the term of appointment, and in exceptionally rare cases officers had been made permanent, but the great majority of sanitary inspectors held their offices only from year to year. The best, because the most conscientious men, were the most liable to dismissal, and instances of this kind were of frequent occurrence. The second hindrance was the total absence of any provision for retirement. After a man had spent his life in arduous, dangerous, and important public work, most frequently for a totally inadequate remuneration, he must, when getting into years, or incapacitated, resign—this meant for very many almost beggary, or the workhouse. What chance had a man with 100*l.* a year salary, and a family to bring up, to save for old age?

The third hindrance to efficiency of sanitary officers consisted in the capriciousness with which appointments were frequently made. A man of insufficient experience or of little capacity, perhaps some broken tradesman who happened to be popular, gets appointed, while an officer of experience and capacity is left to shift for himself, perhaps after a dozen years of service. "It would really appear," said the President, "as if the remedy for the hindrances mentioned lies in all sanitary officers being constituted Government officials, and responsible to a new Department of State, with a Cabinet Minister at its head—the said Minister to be liable to questions in Parliament as to the state of every sanitary district in the kingdom, and of the administration thereof."

Mr. Bland (Chairman, North-Western and Midland Branch of the Association) proposed a vote of thanks to the President, which was seconded by Mr. Curley, supported by Mr. Sumner (Wigan) and Mr. T. J. Moss-Flower (Chairman, Sanitary Inspectors' Association), and carried by acclamation; and Mr. MacMahon briefly replied.

Certificates of Sanitary Fitness.

A paper was read by Mr. Hudson (Chief Inspector, Cheltenham) on the "Granting of Certificates of Sanitary Fitness by Sanitary Authorities." Mr. Hudson advocated the policy which had been in vogue for some years, particularly in seaside towns and other health resorts, of employing sanitary inspectors to test the sanitary arrangements of houses where invited to do so with a view to a certificate of sanitary fitness being granted by the Sanitary Authority on the tests proving satisfactory. The writer admitted that sanitary inspectors could not be legally required to do this, nor was it a part of his duties as laid down by the Local Government Board; but such inspections were germane to the sanitary inspector's work, and the certificates had proved a great boon to the public. The final test should be made in the presence of a sanitary inspector, but there need be no interference by the Local Authority with the professional practice of architects or engineers. In Scarborough it was the practice to renew the tests and certificates annually; in Eastbourne every three years. The system had been the means of revealing and removing sanitary defects in places where otherwise they would have remained undiscovered and might have become a danger to public health. The certification facilitated the letting of lodging-houses, boarding-houses, and hotels, and lightened the task of new settlers in the search for sanitary houses.

In the discussion which followed the opinions expressed were very various. Mr. Grant (Eastbourne) said the system had been adopted in his borough ten years ago, and it was to-day an unqualified success. Mr. MacMahon said they had been in the habit of giving certificates, but they had no legal authority, and they probably incurred liability in doing it. If the points which Mr. Hudson had referred to were guarded against not much harm could be done by giving a certificate, and if more were made sanitary by its adoption, well and good. At Torquay they would only regard such certificates as really valuable at the time of testing. On the whole the system appeared to work well in many places. Objections were raised on certain points by Messrs. Jacklin (Maidstone), Humphery (Reigate), Turner (Deptford), and Holmes (West Riding of Yorks), and Moss-Flower.

The Public Health.

In the next paper, read by Mr. Spears (West Bromwich), under the title "Considerations by the Way," it was stated that an investigation made some fifteen years ago into the constitution of two hundred Boards of Health showed, in the opinion of the writer, "that nearly 84 per cent. of the number of those serving upon Boards of Health, taken as members of classes, and considering their interest and fitness, either presented a negative attitude or were in active opposition to the administration of the Public Health Acts."

What hope could there be of improved administration where the very administrators were proved to be unfit to perform the duties they had undertaken? As a remedy, Mr. Spears suggests that the administration of the Public Health Acts should be taken out of the hands of the local authorities altogether, and be vested in the State itself. The nationalisation of land, the nationalisation of railways, the nationalisation of wealth, had each their advocates. Why should there not be a nationalisation of health?

Sir Wm. Preece could not agree with all Mr. Spears had said, but he sympathised in his complaints of the imperfections of our Local Authorities. What they wanted was men of experience of the world, and such men could only be attracted by education. When a Government Department failed, it was usually because the legislature had not invested that Department with power sufficient to enable it to fulfil the duty imposed upon it. When the Local Government Board had given its approval to any scheme, it had no further control. They attacked Government Departments, but was it not possible for Government Departments to attack them? Did the inspectors always carry out what they expected and what they desired to do? If they had not sufficient powers, let them take as much as they could. No man was likely to be blamed for doing his work too well. Every inspector, however small his office, should possess a diploma of that Institute, or of some other approved by the authorities, but in no case should he be allowed to practise unless he obtained a diploma. There was naturally a strong desire on the part of sanitary officers to secure not only fixity of tenure of their office, but also the pension that would follow. Demands of that kind were so numerous that the Government were compelled to refuse them altogether. They refused because to comply would enormously multiply the number of Government officials. No Government could look without disfavour on any scheme of nationalisation.

Mr. H. Law (Chairman of Council of the Institute) fully endorsed the remarks of the President.

By-Laws.

Mr. S. C. G. Fairchild (Clapham) read a paper on "By-Laws." It was surprising to find in comparing the by-laws of different Local Authorities, which were all based on the Model By-Laws, and were approved by the Local Government Board, that there were so many variations. The author concluded that it would be of considerable advantage if the by-laws were more uniform and definite throughout the country, and that there were by-laws made and adopted dealing with the general state of repair and cleansing of dwelling houses, and that it should be an offence to construct, amend, or alter any drain or fitting in connexion with water supply, water-closet, or other sanitary appliance or arrangement, without first giving notice to the officers of the Local Sanitary Authority.

A discussion followed, in which Messrs. Turner (Deptford), Lowry (Ciseley), Holmes (West Riding), Moss-Flower (Bristol), Davenport (Nantwich), Hudson, Spears, Fairchild, Thomas (Bermondsey), Bland, and the Chairman took part.

Mr. Moss-Flower formulated a resolution in favour of amending and bringing up to date the model by-laws which dated from 1876, and making them imperative. Mr. Thomas, supported by many speakers, moved the adjournment of the matter for twelve months and this was ultimately carried by a large majority.

The Conference then adjourned to Thursday, when the following three papers were read and discussed:—"Crew Space on Board Ships" by Mr. R. W. Lee, "Cisternage and Constant Water Service" by Mr. Hugh Alexander (Shoreditch), and "Sanitation of Private Schools" by Mr. J. H. Clarke (Chiswick).

ENGINEERING AND ARCHITECTURE SECTION.

Mr. Alderman Lemon (ex-Mayor of Southampton) presided over this section, which assembled on Thursday morning at Hartley College. We printed the greater part of Mr. Lemon's address in our last issue, page 217.

Sir William Preece, in proposing a vote of thanks to Mr. Alderman Lemon for his address, said that Alderman Lemon had dealt with the whole subject in a very comprehensive manner, and had made many valuable suggestions, particularly on the question of giving the charge of water areas to districts with proper apportionment, and the provision of electric road power tramways and light railways as a means for helping on the solution of the difficult housing problem.

The resolution having been carried by acclamation, the President briefly acknowledged the compliment, and at once called upon

Professor Robinson to read the first paper, "The Storage of Flood Water."

No criticism being offered at the close, the usual vote of thanks was accorded, and Professor Robinson briefly responded.

Cisterns.

Mr. Ernest Collins's paper was then read by Major Flower (in the absence of the author), on "Cisterns: Their Use and Necessity with Constant Water Supply." In houses inhabited by the very poor the author considered the want of proper receptacles for the storage of water a great hardship. Their abolition led to great waste of water. The following plan was recommended by the author of the paper:—A communication pipe is taken from the main to the premises, a screw-down stop-valve being provided at the entrance. This pipe is carried to the cistern and attached thereto, and before reaching the cistern there are one or more draw taps for drawing water for dietetic purposes only. The remainder of the fittings supplying water-closets, urinals, taps, &c., are supplied by a separate draw-off pipe from the cistern.

After strongly condemning most of the cisterns in use, Mr. Collins highly commended an improved "self-cleaning air-tight cistern," devised by Mr. Hugh Alexander, Chief Sanitary Inspector for Shoreditch, to which attention has already been drawn in our columns.

Hospital Planning.

Mr. Wm. Henman, F.R.I.B.A., Birmingham then read a paper on "Developments in Hospital Planning resulting from the Employment of 'Plenum' Ventilation."

The intelligent planning of hospitals had advanced, he said, line by line with knowledge of the necessity for good ventilation, and consequently we might fairly look to improvements in methods and means for securing efficient ventilation to suggest further developments in plan and construction. Efficient lighting and the necessity for absolute cleanliness in every part were of the utmost importance, and had exerted a considerable effect in determining the design, arrangement, and construction of such buildings. The leading feature of the "Pavilion" plan of arrangement, the invention of a French architect of this century (M. Tollet), was the central gangway, with windows on both sides of the wards. With proper care and management and efficient warming appliances patients might be nursed in comfort in small hospitals on this principle, but for larger hospitals in most situations a proper amount of ventilation could not always be secured in the "pavilion" arrangement. "Fans" either for extracting vitiated air or for propelling fresh air into buildings were now generally employed for hospital purposes, and of these two methods "propulsion" had proved itself the better for hospitals. This plan, known as the "Plenum" system, had been in successful operation for some years past in hospitals, asylums, schools, and other buildings. As both the inflow and outflow of air under the "Plenum" system must be under complete control there could be no opening of windows.

The realisation of these facts led to a correspondence in the *Builder* just three years ago, when several writers advocated a change of plan, principally with a view to the attainment of better architectural effect in hospital buildings, by the employment of double wards with a dwarf partition down the centre. He ventured to make known his views in a communication to the Editor of the *Builder*, dated August 8, 1896.

On this letter appearing in the following issue, it attracted attention, and when, after a careful comparison of his work at the General Hospital, Birmingham, with other recently erected hospitals, the Committee, previously unknown to him, determined to place in his hands the preparation of designs for the Belfast Royal Victoria Hospital, providing accommodation for three hundred beds, he found a majority at least in favour of considering a design based upon the suggestion he had made, and as the work proceeded, he had been most gratified to realise how those who in the first instance put forward objections, had one by one been converted, and now look favourably upon the scheme. The novelty of the plan so entirely revolutionised preconceived ideas of what was essential in hospital design, that he had considered it of sufficient importance to introduce it to the Congress as an idea that would ere long be practically realised, and when the large outlay was considered (over 100,000*l.*) it was obvious the most anxious consideration must have been given to every detail. "The principal novelty," he said, "is that the wards and their accessory rooms are placed side by side, with no open space intervening. They are all on one floor level, and practically under one roof, and are approached by short corridors branching off a main corridor running at right angles to the length of the wards. There are eight wards of sixteen beds each for medical cases, also eight wards of sixteen beds for surgical cases, one ward of sixteen beds for gynœcological cases, two wards each of eight beds for ophthalmic cases, a large out-patients' or 'Extern' department, pathological department and lecture theatre, all on the ground floor level." For use in connexion with every ward of sixteen beds there was a single-bed ward, a bath-room, lavatory, and conveniences, besides stores for linen and clothes.

A number of drawings shown gave a good general idea of the appearance of the buildings within and without. The axis of the wards is nearly north and south. Each ward of sixteen beds has a large window at the southern end opening on to a covered balcony that commands a park-like view to high hills beyond. Sunlight can be admitted at all times, and regulated by draw-down blinds.

The compactness of the plan not only simplified administration and reduced labour, but it lent itself to the "Plenum" system of ventilation far more readily and with more certain results than when buildings were of several stories. The main air ducts were under the corridors, from which separate flues were carried up to the several wards, rooms, and corridors. The air outlets were at the floor level, with flues descending to ducts by which the vitiated air passes to the open through ventilating turrets at the ends of the wards. By this arrangement all ducts and flues would be easily accessible for cleaning, and each ward and room was practically isolated from every other in consequence of each receiving its own fresh air supply direct. There was no necessity for "intercepting lobbies" between wards and conveniences, because air from the latter was not allowed to travel to the former.

Discussion.

Mr. T. Blashill, F.R.I.B.A., in proposing that a hearty vote of thanks be given to Mr. Henman for giving them a paper of so much importance and interest, said he would not presume to criticise it, for he had no experience in matters of the kind treated of. Was it not possible to so alter the outlets of air as to draw in more ozone or air suitable for particular diseases? It seemed to him an experiment well worth trying.

Mr. Edwin T. Hall, F.R.I.B.A., said anything Mr. Henman took up he did thoroughly, and they might be certain he would not present to them what he did not thoroughly believe in. The old hospitals were built on the block system, but the block hospital had now become obsolete. Yet Mr. Henman gave them a new block hospital scheme quite up to date. In the speaker's judgment, the "Plenum" system of ventilation had one advantage over all others that relied on natural ventilation—they could control the admission and emission of air more completely than in any natural system. Airways were not always *per se* an advantage. They might have hundreds of flues and not be able properly to get at them. (Mr. Henman: They are 2 ft. by 9 in.). If they were of the usual dimensions, 9 in. by 9 in., no man could go through them and they could only be cleaned by the use of a chimney-sweep's brush. There must be, in course of time, deposits in these flues. What was to prevent insects or bacteria lodging in the flues? He had the greatest objection to a system of covered air ducts. These were admirably lighted rooms. The window at the end was very good for convalescents, but people of a highly nervous temperament could not bear a sky-lighted room. They got plenty of light, but they had not the cheerfulness of side-lights. Cross currents of light had a valuable curative effect. Cost was a serious matter. The design would be cheap but it must be expensive in maintenance because it took no advantage of natural ventilation. Then the inlets and outlets must be under control. (Mr. Henman: No.) There must be a certain amount of labour. (No labour.) Mr. Henman put the velocity at 200 ft. per minute, but it must depend on the size of the flue. Mr. Henman had not converted his staff to the plenum system, for they had side-lights. Why should not technical people accept what they recommended to their patients? Again, how would it work in ten or twelve years, particularly if a case of infectious disease got a fair hold? Then, if a ward were on fire, was there not a risk of its being communicated from ward to ward.

After some further observations from Messrs. Morris, Hair, and Cooper,

Dr. Childs (Oxford University) said that in calling this a new departure, they meant for hospitals, no doubt, because the "Plenum" system had been well known for a long time. At a large London Board School (for 1,400 children) the "Plenum" system had been given up, not, perhaps, on account of any fault in the system itself, but because the teachers could not properly control it. The question of ventilation was in a barbaric state. We had not yet begun to learn its principles. Our churches, schools, theatres, and even our dining and sleeping rooms are not ventilated at all. We had certain more or less ingenious methods for turning on draughts, but no methods of ventilation.

After further remarks from Messrs. Kaye, Munce (Belfast), who said the hospital described was not for infectious diseases, and Whitby, the vote was accorded with acclamation.

Mr. Henman, in acknowledging the compliment, replied to various points raised. He had felt it impossible to go fully into the question of "Plenum" ventilation. It was difficult to understand until you were let into the secret; but when you knew it, it was very simple. There was no difficulty in regulating the temperature throughout the building. At Birmingham it was maintained at from sixty-two to sixty-four degrees in the medical ward, and at from sixty to sixty-two degrees in the surgical ward. Even in hot weather the general hospital at Birmingham was the most comfortable place to be in. The surgeons said it was perfect from their point of view, because they knew their patients were not subject to draughts. The air of one room or ward could not be communicated to other wards. They might have obtained greater concentration but it did not suit their purpose to do so. The wards would be very cheerful, because there was nothing to distract or irritate. No side-lights were necessary. The system would cost a little more per bed, but how much it was impossible to say. The flues would cost more, perhaps, than ordinary fireplaces, but not much—possibly 2,000*l.* more on a total of 130,000*l.* The first cost was not great, that of maintenance very small, and the labour involved was slight.

The other papers read on Thursday in this section were, "Notes on the Construction of Cottages for Agricultural Labourers," by Mr. George Smith; "On the Drainage of Buildings Possessing no Open Space," by Major Lamorock Flower, and "The Prospective and Retrospective Aspect of Combined House Drains," by Mr. A. T. Allen.

Votes of thanks were accorded to the readers of the papers, and after a similar vote accorded to and acknowledged by Alderman Lemon, the section adjourned.

When the section resumed on Friday morning, a paper on "Ventilation of Sewers," prepared by Dr. D. S. Davies, M.O.H., Bristol, was read by Major Lamorock Flower, in the absence of the author. The necessity of cutting off every house drain from the street sewer by an intercepting trap was insisted upon in the paper, all other conditions necessary to render the admission of drain air to the house impossible being observed. Beyond that, was it necessary to ventilate or encourage continuous air currents in the sewer? The author replied, with Dr. Francis Clark (Lowestoft), that there were better ways of dealing with sewage emanations than that of forcing them down the throat of "the man in the street," by mixing them with the atmosphere we breathe. Again, was there medical evidence of the need for sewer vedtilation? In Bristol they were not now, and never had been, ventilated, and in order to ascertain the ill effect, if any, arising from this he had prepared for the Bristol Council an analysis of ten years' returns (1888 to 1897) of the Registrar General's reports relating to Bristol, comparing them with those for certain other towns noted as generally healthy. London, Brighton, and Croydon (except as regards diphtheria), all showed lower rates of mortality than the average of the thirty-three great towns, and the table of Dr. Davies showed that the rate in Bristol was lower from all causes than in London, and from diphtheria and diarrhœa much lower than in any of them, while for fever the rate was ·11 per 1,000 in Bristol, Brighton, and Croydon, but ·15 in London, and ·20 in the thirty-three great towns. London, Brighton, and Croydon, and the great majority of the thirty-three towns had ventilated sewers, yet Bristol—an old, closely-built, and densely-populated city, with unventilated sewers—bore favourable comparison, even in fever and diphtheria. Thus, old Bristol need fear no comparison with new towns like Croydon and Brighton; while Clifton (including a populous working-class district in the Hotwells) stood far above them all for general health, and especially for its freedom from fever, diphtheria, and diarrhœa.

A discussion followed in which Dr. Reed (Gloucester), Dr. Scurfield (Sunderland), Dr. Porter (Stockport), Dr. Newsholme (Brighton), Dr. Marsden (Birkenhead), Mr. Smith (Lowestoft), Mr. MacBriar (Lincoln), Mr. Moss-Flower (Bristol), Mr. Mawbey (Leicester), and Alderman Lemon (Southampton) took part.

Dr. Reed said an unventilated sewer was a physical impossibility. Bristol sewers, like those of other towns, ventilated themselves through the house drains. Bristol had exceptionally good sewers. They had good gradients and got an enormous amount of flushing. They might not be officially "ventilated sewers" but they were naturally ventilated. That knocked the bottom out of the comparison with Brighton and Croydon, which were both ventilated.

Dr. Newsholme said the last speaker had

pointed out very clearly the weakness of the argument founded on Dr. Davies's table. He (Dr. Newsholme) must enter his protest against a table which did not state all the necessary facts of the case. It was misleading to compare Clifton, a rich district with poor districts. Diarrhœa occurred chiefly in dry, hot summers, but Bristol, being on the west coast, was never so hot as towns further east. The difference of level above the sea—the character of towns as to sewage disposal, whether pail or closet towns, were factors in the comparison. The same argument might be used in favour of the pail rather than the water-closet which would be a *reductio ad absurdum*. They must take into account all the factors. The figures with regard to Brighton did not prove what they appeared to prove.

Dr. Marsden said the subject was one of the most important of those which were exercising the minds of Local Authorities. The whole tendency of recent sanitation was to prevent the access of sewer gas into our houses, but it seemed to him that Dr. Davies had shown that you can close your sewers without injury to the health of towns. The question was, Could they do without grids, or could they not? He would be glad to get light, and he hoped the engineers present would show that sewer ventilation was not so absolutely essential as they had been led to believe. If Bristol, Bath, and Leicester could do without it, why not all towns? Birkenhead was a well ventilated town, but its death rate did not compare favourably with that of Bristol. They were going in for an enquiry. If they could do without the horrible system of ventilation by grids they would gladly do away with it.

Dr. Sanfield said in all towns where there were street grids, we have complaints of the stench arising from them. Of course, no one expected the air in their sewers to be as pure as the air in their rooms. He would like to know what would happen if they had a thunderstorm when the sewer-air was tide-locked.

Mr. Smith said, in reply to a remark by Dr. Newsholme, that there were worse slums in Clifton than in almost any other place. Houses formerly occupied by some well-to-do family, were now occupied by many families, and were very insanitary.

Mr. Moss-Flower, C.E. (Bristol), said the slums of Clifton were in the Hotwells, and the Clifton Sanitary Authority had nothing to do with the Hotwells. With regard to the point raised by Dr. Scurfield he said there was no pressure in the sewers. He had been called in at Clifton in cases of diphtheria and other zymotic diseases, and in every case he found that there existed means of admitting sewer air into the house. In one very bad case which broke out in a semi-detached villa he found a rain-water pipe in contact with a trumpet-mouthed waste-pipe by which sewer air might get into the house. He believed he had found the cause of the disease. If they were to sever a pipe from the disconnecting trap there would be a deplorable state of things. It stood to the credit of Dr. Davies and his staff that the death-rate in Bristol was low. It was possible to make Bristol more healthy still if they adopted some means of ventilation in the low parts of the district. The gases rise to the higher districts. What was wanted was a reconstruction of the sewers with means of ventilation suitable to each particular locality.

Mr. Mawbey (Borough Engineer, Leicester), was quite certain, as experiments at Leicester had proved, that we could sufficiently ventilate sewers without open grates. He was very much gratified to hear one medical officer after another supporting the suppression of street grids, but we ought to ventilate sewers in some way, because there must be displacements of sewer-gas, and we should have a moderate number of ventilated sewers to discharge this above the house-tops. In one experiment they shut up every grid and every ventilating-pipe, and left only two shafts in the street, and carried out careful tests to discover the velocity of the air in the shafts. The up-cast shaft registered 25·62 cubic ft. per minute, and the down-cast shaft 68 cubic ft. per minute. Where did the difference come from if not from natural ventilation? If officers of health, instead of trying to be engineers as well as officers of health, would support them (the engineers) in committees, they would be much obliged to them. They took good care that every ventilating shaft should be taken up right above the top of the ridge. The best arrangement would be a moderate system of ventilation shafts and no grids.

Mr. Alderman Lemon, in winding up the discussion, said no town was without some means of ventilation; but if it was necessary to have ventilation let them not do it on any haphazard system, but on some regular system.

The business of the section was brought to a close by the reading of two papers on "Sewage Purification," the first by Mr. Martin, Exeter, of the Septic Tank Syndicate, and the other by Mr. Ross, for the author of the paper, Mr. W. Kaye Parry, Dublin. Mr. Martin showed how to make provision for "storm water" in purification works without unduly adding to their cost. Mr. Kaye Parry's paper was a vindication of Dr. Adeney's modification of the biological treatment of sewage. Dr. Adeney employs a small quantity of oxygen-carrying chemicals to assist the rapid oxidation of the sewage. Interesting discussions followed, in which Mr. G. Thudichum, Mr. Martin, Mr. Campkin (Cambridge), and the President took part.

The concluding general meeting of the Congress was held in the afternoon. The Secretary, Mr. White Wallis, read his report on the Congress proceedings.

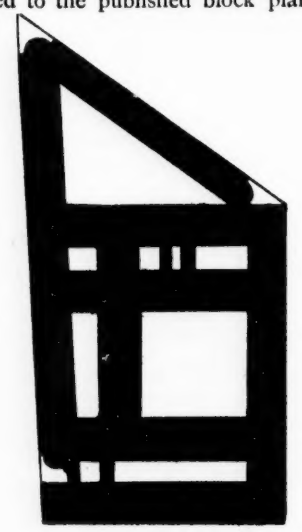
After the usual votes of thanks, a resolution was also carried expressing the gratification of the members on learning the intention of the Corporation to preserve the Undercroft (a mediæval vault in the town) as a memorial of antiquity, it being an object of interest, not only to residents, but to visitors. The resolution has been forwarded to the Town Council.

Illustrations.

MR. GARLING'S DESIGN FOR THE NEW WAR OFFICE.

THIS design, which was exhibited at the Royal Academy of this year, was wrongly described in the catalogue as being the design submitted "in the original competition of 1857," and was accordingly noticed as such in our review of the Academy drawings. It appears, however, that this was a flagrant blunder of the R.A. catalogue, and one very unfair to Mr. Garling. Mr. Garling was the first premiated competitor in the competition of 1857,* and naturally felt a considerable interest in the new scheme of to-day; and this drawing is his design for treating the building on the new site, and following the general lines of the Office of Works' block plan. The following is the author's description of his intention in the design:—

"This design has been studied from and adapted to the published block plans of the



PLAN SHOWING WAY OF DEALING WITH CANT CORNERS, PRESERVING THE SQUARE ANGLES IN THE FRONT WITHOUT LOSS OF SPACE.

Office of Works as applied to the selected Carrington House site.

A block plan to a small scale is appended, showing how the inconvenience and artistic disadvantages of the cant angle of the northern and eastern façades may be got over without any appreciable loss of space in the internal arrangements. The building is treated as its appropriation requires, as a stack of offices requiring abundance of light, and, therefore, with ranges of windows in every floor, not more than 10 ft. 6 in. from centre to centre and 4 ft. wide, the dignity and monumental character suitable to a public building being attempted to be gained by carefully balanced and carefully proportioned masses in the main divisions of the building; the columniation and pilastration of the principal façades being kept perfectly subordinate, and the returns of the attic story of wings and centre carefully studied so as to add to the effect of the façades and carry the decoration evenly round.

The angle tourelles are 40 ft. square and the centre masses 40 ft. deep, so as to embrace the corridor at the rear. The position and height of windows has been carefully arranged with due regard to the height and convenience of light and air in the interior.

Sculpture is very sparingly used, but in the War Office of a country whose military history is such a roll of splendid victories, there should surely be some memorial of the great captains who led our armies to certain victory, some record, too, of the famous fields on which their laurels were won, of men who moulded the history of their time, and of battles that crushed empires at a blow.

It is proposed in the Whitehall front, in niches in the centre, to put statues of Cromwell, Marlborough, Wellington, and Clive; in the southern front statues of Harold, Edward I., the Black Prince, and Henry V., Wolfe and Moore.

On the column of the Whitehall front between the wings on the attic story would be figures of the various arms of the Service, such as are placed on the columns of the beautiful Arc du Carrousel behind the demolished front of the Tuileries at Paris, in which modern costume is so skilfully treated.

It would not be out of place or unreasonable to record our great victories, the susceptibilities of our 'friends the enemy' to the contrary notwithstanding; we should keep the memory of these grand achievements ever fresh in the public mind, that all Englishmen might know the glorious inheritance to which they are born and learn to act worthily of it."

* His design was illustrated in the *Builder* for August 1, 1857.

ROYAL PUMP-ROOM, HARROGATE.

THIS design was submitted in competition for the rebuilding of the Pump-room, Harrogate, and was awarded the first premium.

It was intended to execute the building in local stone, and to line the interior throughout with faïence.

Owing to the contracted area of the site, some difficulty was experienced in obtaining the accommodation required, and precautions had to be taken not to interfere with the old sulphur spring which is in the basement of the existing building.

The architect, Mr. F. Anderson (London), was also awarded the first premium for his design for the alternative scheme for enlarging the existing Pump-room.

STUDY FOR A SMALL COUNTRY HOUSE.

THESE elevations and plans for a small country house, made by the author, Mr. F. B. Cooper, some two or three years ago, require no explanation, as the drawings speak for themselves.

On one point we may, however, comment, in regard, namely, to that often neglected question of aspect. East is a good aspect for a dining-room, and south is a good one for a drawing-room, and one may congratulate the author on having avoided the too common mistake, in small houses, of facing the drawing-room and dining-room the same way; but south is a bad light for a library. It is nearly the same with reading as with drawing—a good light is required, but direct sunlight is a nuisance.

ÉCOLE DES BEAUX-ARTS PRIZE WORKS.

WE give this week reproductions of the works which obtained the first prize in the Prix-de-Rome competition recently, in painting and sculpture.

The painting, by M. Roger, represents the "Choice of Hercules," or "Hercules hesitating between Virtue and Vice," the subject given to the students.

The subject given for sculpture was "Adam

and Eve lamenting the Death of Abel," and the prize was gained by M. Vermare, whose work we illustrate.

We shall have opportunity also of illustrating the Prix-de-Rome design in architecture.

MAGAZINES AND REVIEWS.

THE *Art Journal* contains no article on any important subject; the most original contribution is Mr. Fred Miller's short paper, "A Landscape Painter's Apology," the apology being for the apparent ease and idleness of the occupation, in the eyes of the public, who are here instructed in the fact that out-door landscape-painting is really very hard and often unpleasant work, carried on under many drawbacks and difficulties. Perhaps such a protest would be more in place in a general magazine than in one specially devoted to art, the readers of which ought hardly to want this information. Mr. Scott Rankin's illustrations to the article on Loch Tay are very good. We observe that in a short article on Baron von Meyer's photographs the idea of the use of photography as a mode of artistic invention is again put forward; but the half-length entitled "Beatrice," if it be meant for Dante's heroine, is only another example of the futility of the idea; the expression of the countenance falls quite below the ideal of Beatrice; a painter could have conveyed the required expression into it, a photographer cannot. The most interesting illustrations in "Fifty Years of Art" are those from Bewick and F. Sandys.

The *Studio* (August 15) contains two articles of considerable interest from an architectural point of view, one on houses by Mr. Ernest Newton, the other on the application of Japanese decoration to a London interior, in the house of Mr. Mortimer Menpes in Cadogan-gardens. Mr. Forrester Scott's sketches at Louviers are good examples of free architectural sketching.

In connexion with some illustrations of French sculpture, the *Artist* truly remarks that "in Paris everything is done to make the sculpture show to advantage—in London no treatment is too bad for it. The result is that sculpture in London exists as a tender exotic, in France it is the heroic expression of a heroic nation." Some illustrations of vegetation as suggestions for decorative carving are well chosen. What is the charm or desirability of the etchings by Heinrich Vogler we fail to see; they are new illustrations of the modern taste for the hideous and diseased in art.

The *Engineering Magazine* contains an article on the water-supply and water-works of Glasgow.

The *Antiquary* contains two articles of considerable special interest, that on "Old Hampstead Trees and Their Associations," by Mrs. Maxwell, and that by Mr. G. L. Apperson on "James Cox's Museum," an account of what was in its day a notable show, famed far and wide and referred to frequently in contemporary literature, though now totally forgotten.

The *Century* contains an article on the Cathedral of Le Puy, by Mrs. Van Rensselaer, with illustrations by Mr. Joseph Pennell—illustrations very effective, but not of value in an architectural point of view, being too "sloppy" in style and detail. The frontispiece after a seapiece by Cotman, engraved by Mr. Timothy Cole (one of the series of "Engravings of Old English Masters") is a very good example of effect gained by honest line engraving.

Under "The Field of Art," *Scribner* enters into the question, "The Use and Abuse of Decorative Conventions in Architecture." The main object of the article (which is signed "F. C.") is the now rather old point of discountenancing the reproduction of conventionally accepted ornaments of the Classic type—at least the writer refers to the Classic type specially, because, we presume, it is the one most drawn upon in America. In urging (and we think rightly) that the Greek and Roman architects were much more inventive of new forms than is generally recognised, he makes a good instance with the Roman arch at Timgad—"the problem being to build a Roman arch, who would ever have dreamed of constructing such and one as we find at Timgad, dedicated to Trajan, with its lateral bays crowned by curved pediments?" That is true of general design, but the author seems rather to forget that in decorative detail there is a remarkable sameness, a remarkable degree of repetition, in classic work; the same few ornaments seem to be accepted and repeated everywhere; and it is with detail that his article is professedly concerned. The following remark at the close is well put. On the part of the client, he observes—

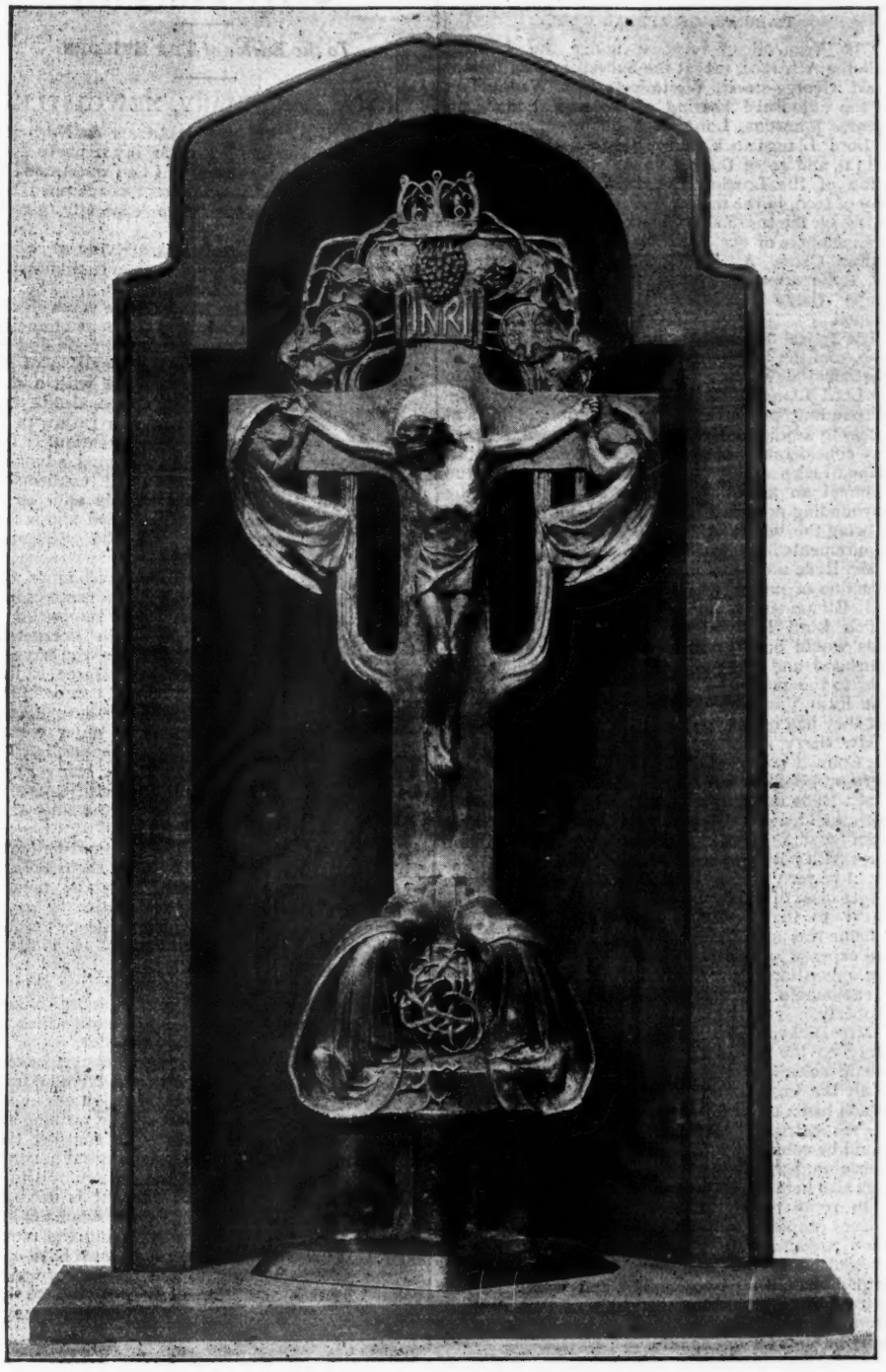
> "Not much objection seems to be made to a lavish outlay on mere barbaric material, but a vigorous stand is taken against an outlay on artistic invention. What is the result? Unable to evolve fresh motives, the architect, perforce, turns to his portfolios and copies. He must have ornament, for ornament is part and parcel of his profession as well as solid construction and harmonious proportion. Therefore, he purloins it. There is no sin in it, for it is done overtly and no one is deceived. Any man in the other professions would do likewise under similar conditions. It would be reprehensible if he did not. Only this road does not lead to new ideas—to a new style. Artistic invention cannot thrive under such conditions."

The *Fortnightly* contains an article by a Mr. C. G. Harper, whose name is unfamiliar to us, on "The Government and London Architecture," advocating the more liberal expenditure of money on national buildings, which is all quite right; but it strikes us that the writer is a good deal indebted both for his facts and his conclusions to articles written not long since in the *Fortnightly* and elsewhere by the editor of this journal; at all events, he is only repeating what has been already said.

The *Gentleman's Magazine* contains an article of more than the average length of its contributions, on "Old London Taverns and Tea-gardens," by Mr. Heckethorne, who does not profess to have absolutely new information to offer, but who has collected a great deal in a readable form, and new to general readers probably. The same number contains an article on "Goblets and Drinking-cups," by Mr. Pelham Gordon.

Knowledge includes an article on "Sound Reflection and Refraction," which is of interest to architects, and an illustrated one on "Clouds," which should be of interest to painters.

The *Quarry* and *Builders' Merchant* continues the essay on "Mineral Industry of the United Kingdom," to which we have already referred.



Crucifix in Cast Silver. By Mr. Alexander Fisher.

CRUCIFIX IN CAST SILVER.

THIS work, by Mr. A. Fisher, was exhibited in the sculpture-room of the Royal Academy this year, and was noticed in our article on that section of the exhibition.

The use of cast silver, to which modern art-workers in metal are rather turning their attention, gives a special surface and character of material totally distinct from that of worked silver, and which requires a special treatment of design to suit the quality of the material; more rounded surfaces and a broader handling, which are well illustrated in this design.

LONDON BUILDING ACT, 1894:

TRIBUNAL OF APPEAL CASE.

THE Tribunal of Appeal under the London Building Act, 1894, sat at the Surveyors' Institution, Great George-street, Westminster, on Wednesday, for the adjourned hearing of the appeal made by Messrs. Johnsons, Long, & Williamson, on behalf of Lord Llangattock, under Sections 13 (4), 41 (1) and (2), and 44 of the above Act, against the resolution of the London County Council, passed on May 9, 1899, in the matter of the proposed dwelling-houses on the south side of Nursery-row, Walworth. The members of the Tribunal present were Messrs. Arthur Cates, A. H. Hudson, and J. Penfold. Mr. Ryde appeared for the appellants, and Mr. Seager Berry represented the London County Council.

The appeal originally came before the Tribunal in June, and the question raised by the Council was whether the widening proposed to be undertaken by Lord Llangattock would be prejudicial to the surrounding property so far as light and air and access to adjoining streets were concerned. There was considerable discussion, and eventually Lord Llangattock's architect undertook to present to the Tribunal an amended scheme to deal with the surrounding property belonging to his lordship so as to bring the whole up to the standard of modern requirements in regard to light, air and space.

Mr. Ryde now produced a plan showing a reconstruction of property in Orb-street, Brandon-street, and Etham-street, in addition to Nursery-row, which Lord Llangattock proposed to carry out. This would be a great improvement to the neighbourhood, and two pieces of land would be handed over to the public in Orb-street and Nursery-row. The local Vestry at first offered some opposition, but they had now withdrawn it.

Mr. Berry intimated that the main objection of the Council was to the height of the houses which were proposed to be erected in Etham-street.

Mr. Ryde said this was not a scheme put forward with the idea of getting as much money as possible from tenants. If the land had been let on a building lease with power to erect such artisans' dwellings as could be seen within the immediate vicinity, a much larger class of property could be built in Etham-street to that which was now proposed. If the scheme was an attempt to get the last farthing at the expense of air and light, he could understand the opposition of the Council; but this was merely a reasonable scheme for the improvement of the property.

Mr. Dickens, surveyor to Lord Llangattock, in reply to the members of the Tribunal, said the whole scheme could not be carried out at once. With the exception of the "Crown" public-house, which had a twenty years' unexpired lease, the work of reconstructing the property in Brandon-street could be commenced now; but there was a warehouse in Etham-street and other property which was also held under leases.

In reply to Mr. Berry, Mr. Dickens said the houses proposed to be erected in Etham-street would each accommodate about ten people, whereas the present houses only accommodated about six. They would be built for two families, and would, he presumed, bring in an income double of that received from the new houses in Nursery-row, which would only be built for one family.

The Tribunal allowed the appeal, subject to no buildings, with the exception of the "Crown" public-house, being re-erected at a greater height than shown on the plan submitted by Lord Llangattock; subject to the two pieces of land in Orb-street and Nursery-row being dedicated to the public; and subject to the houses in Etham-street, at the rear of the intended houses, Nos. 2 to 24 even numbers), Nursery-row, not being allowed to stand more than eleven years from the present date.

At the suggestion of Mr. Berry it was decided to have these conditions embodied in a covenant.

BOOKS RECEIVED.

HANDBOOK FOR WILTS AND DORSET. Fifth dition. (John Murray.)

FIREPROOFING TRADE AT THE PARIS EXHIBITION.—There will be an important collective exhibit at the Paris Exhibition next year, representing the fire-resisting materials, system of construction, and appliances of Great Britain. The arrangement of this collective exhibit (the first of its kind) is in the hands of the British Fire Prevention Committee, to whom the Royal Commission has allotted the necessary space gratuitously, recognising the national importance of the idea and the disinterestedness of the effort being made by the committee to show what the country can produce in this direction. Mr. Frederick R. Farrow, Chairman of the Commercial Section of the Committee, has kindly undertaken the direction of this collective exhibit, and it has been decided that all applications from British and Colonial firms to be represented in this national exhibit must reach the offices of the committee by October 7. The committee itself will exhibit a model of its testing station, specimens of reports, &c.

Correspondence.

To the Editor of THE BUILDER.

ROYAL INFIRMARY, NEWCASTLE.

SIR,—It is a pity Messrs. Adams & Newcombe should have commented upon my remarks in so personal a manner, as though I had questioned the decision in the competition, and condemned their design, both of which were expressly guarded against.

I am far more interested in arriving at what is really best in hospital planning than in finding fault with the result of any competition.

The quotation, "Who shall decide when doctors disagree?" was made use of in the hope of eliciting information which might enlighten us upon doubtful points, and to urge that the consideration of hospital planning might be approached with a more open mind than is generally the case, also to show that the criticism of my plan in *your* review of the designs was open to reasonable explanation.

The second premiated design having advocated "Plenum" ventilation is additional confirmation that the conditions were not strictly adhered to; because open fireplaces were demanded and are not required with ventilation on the "Plenum" principle.

The fact that few architects have more than vague ideas as to the requirements of ventilation by mechanical means, and that it is impossible to adequately illustrate a scheme in competition drawings to small scale, makes those who have had practical experience realise what a farce it is to introduce the subject in architectural competition.

With regard to the working of an "out-patients'" department, I still maintain that the outer corridor is a mistake. It looks very nice on paper, but I am convinced that Mr. Adams will yet learn that it does not work smoothly in practice, particularly when the attendance is large, as it probably will be at Newcastle.

The intelligence of the majority of out-patients is not of a high order; the bulk of them are newcomers, entirely unacquainted with the arrangement of the buildings and the routine to be gone through; their presence is also evidence that they are out of health, and consequently it is, to say the least, embarrassing to them to be turned into a passage (which, by the way, is not always straight), along which there are numerous doors, alike in appearance, with little or no indication which way the patients are to go or where to enter.

Apart from this probable inconvenience to patients, the attendants at Bedford have no means of access to the hospital except through one or other of the examination-rooms, or else by walking some distance in the open. I therefore consider that I was justified in referring to this hospital in support of my contention that the outer corridor arrangement of an out-patients' department is not necessarily the best; and surely Messrs. Adams & Newcombe are not serious in interpreting the requirement that "the examination-rooms must have egress to the passage leading to the dispensary waiting-room" as only admitting of a *back* passage therefrom.

WILLIAM HENMAN.

THE SMOKE NUISANCE.

SIR,—The important article on the smoke nuisance in your issue of August 12, weighted as it is with convincing statistics of the waste of fuel and its clear presentment of many of the ills which coal smoke inflicts upon us, ought to bring home to all who have the welfare of communities at heart the necessity of steps being taken to mitigate this crying evil.

Doubtless remedial legislation presents many difficulties, and our authorities rightly shrink from any course that would involve hardships in the poorer class of householder.

Having had considerable experience in the manufacture of stove grates and having thought a great deal about this vexed question I venture to submit a plan that it may be safely said would halve our waste of fuel and double our supply of heat.

I would point out, in the first place, that the present system of building the fireplace into the chimney breast involves an immense waste of heat by its being absorbed into the brickwork at the back.

Now, I would suggest that all these stoves be cleared out, and that the rectangular chamber in which they have stood be lined with tiles, a light iron ceiling, with an opening for the flue, being fixed in the top of the chamber.

In the centre of this chamber should stand the stove, preferably in terra-cotta, as the heat by connexion would be softer than that from iron, but iron would be suitable if well lined with fire-brick; in the case of cheap tenements this stove might be the cooking-stove.

The fire might be an open one, as some like its cheery appearance, although the closed stove requires much less fuel and combustion is more complete.

By this simple arrangement we have the direct radiant heat of the open fire and in addition the powerful heating surface of the whole stove coming in contact with the air of the room, which will be kept in continual circulation by the warm air rising and being replaced by the cooler air taking its place.

I have recently seen some admirable stoves of this character in Switzerland, but in that country the stove does not stand in a chimney breast as with us, but is placed in the most convenient spot in the room.

The time may come when these unsightly chimney breasts, so much in the way and so greatly lessening the cubic area of our rooms, will disappear. They are a relic of the days when large wood hearth-fires were in vogue; but our English conservatism clings to the past, even to our inconvenience very often.

There are thousands of old hob-grates in the older houses which are both wasteful and inefficient, and many of the register stoves are little better. If these things could be cleared away, and the method I beg to suggest could be adopted, a practical step would be taken towards saving an immense amount of fuel, the more effectual heating of our houses, and of purifying the air of our towns.

R. W. BROOKES.

DIP IN HOT WATER PIPES.

SIR,—I want to make a doorway into a vinery, but the hot water pipes stand up 9 in. above the floor, and cannot be lowered on account of the boiler. Could I lower the pipes on the flow 12 in. for the width of the proposed doorway (3 ft.), and then raise them again to the original level by means of inserting swans' necks? If I do so, should I get the hot water to flow round the house, or should I get the hot water to flow downhill for 3 ft. and then up again to the original level? G. H.

*** It is always undesirable to make use of this arrangement, and sometimes the flow of water will be entirely stopped in consequence. Everything depends upon the head obtainable for motive force, and this is governed by the height of the ascending and descending columns of water, as to which in the present case we know nothing whatever. As a rule for guidance, the following may be of service to our correspondent:—When the pipe dips below the horizontal level, the height of the ascending pipe above the height of the descending pipe where it enters the boiler must be not less than *extent of "dip" + 16 in.*, centre to centre. Air may accumulate at the bends, but this may be removed by air taps.—ED.

ROOFS IN SUMMER AND IN WINTER.

SIR,—I should advise "B. M. R." to have the underside of rafters in roof felted with the best inodorous felt, and also board the top of ceiling joists, or this may be felted the same as rafters.

If the ceiling cuts up into roof and leaves a space unable to be boarded or felted I should have this stuffed with some non-conductive material such as silicate of cotton.

"B. M. R." would find this much cheaper than a new roof as suggested, and it would keep a good deal of heat and cold back. C. YORKE.

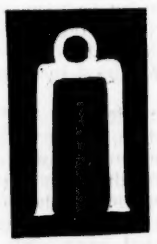
PRICING BILLS OF QUANTITIES.

SIR,—Some time ago I priced out a bill of quantities for a firm of builders, and was successful in obtaining the contract by some 5*l.* in an amount of 4,400*l.* The work is now going on. What is the usual practice as regards fees? If any of your correspondents would answer I shall be obliged.

INQUIRER.

INCISED MARK ON STEP OF FONT.

SIR,—I am enclosing herewith a tracing from a rubbing of a curious incised mark on the north side of the top step of the font of Leverington Church, Cambs. I have made several local enquiries as to its meaning, but can meet with no suggestion; the



rector also informs me that he has frequently enquired and can find no solution.

Can you or your readers afford any clue? The font itself is a handsomely carved one of Perpendicular date. E. BENTLEY WOOD.

P.S.—The size of the figure is 13 in. in height and 6¾ in. across the base.

THE LONDON MANUAL.—We have received the issue for 1899-1900 of this useful manual, which gives a summary of information and statistics as to London Government, Vestries, Water Supply, and other subjects. The present issue contains a great deal of information as to the working of the new London Government Act.

The Student's Column.

ROADS: THEIR CONSTRUCTION AND MAINTENANCE.

PART II.—SELECTING AND TESTING ROAD MATERIALS.

II.—ROAD STONE TESTS.

IN the selection of the most suitable material for road-making many things must be taken into consideration. In the first place, the choice will be regulated by the particular requirements in each case. A main road subjected to heavy traffic will need a different treatment from one used only for light traffic. A paved road will require different material from a macadamised road. The construction of a new road will not be treated in the same way as the maintenance of an old one. Selection will also be to some extent regulated by the gradients which may be encountered. Thus asphalte would be quite unsuitable for a gradient steeper than 1 in 60; wood is unsafe for gradients higher than 1 in 27; brick for steeper slopes than 1 in 17; while stone may be used for a rise of 1 in 10, or even steeper if selected with a view to securing the maximum efficiency as regards foothold. In many cases, also, the choice of material is regulated by the resources of the locality, the extra cost of transport preventing the employment of any material except local stone. It does not, however, always follow that local stone is the cheaper. The extra cost of maintenance, when an inferior stone is used, often more than outweighs the expense incurred in transporting a better material from a distance. At other times questions of cost are immaterial in comparison with the necessity of obtaining the very best road metal which can be procured. It is then that the difficulty of selection is experienced, the differences between stones of the highest class being often very small. Sometimes it may be desired to select a stone to supplement local material, in which case the character of the latter must be considered. To mix a hard material with a softer stone, such, for example, as slag with limestone, would obviously result in uneven wear and a rough surface. When such a mixture cannot be avoided in the construction or repair of macadamised roads, the evil may be diminished by putting on the materials separately in layers, the harder material being placed on top of the softer.

Still another point in the selection of stone is the question of appearance. In districts frequented by pleasure traffic this consideration is of some importance, but in the large centres of business activity everything is sacrificed to utility.

Macadam is supplied broken to the required size, either by hand or by machinery. Many road surveyors prefer hand-broken stone. On this point, however, opinions differ. There is no doubt that a certain amount of crushing takes place in the jaws of a stone-breaking machine which may reduce the durability of the stone, especially those of the softer kinds, such as mountain limestone. Machine-broken stone, also, is not always so cubical in form nor so uniform in size as when broken by hand. Instead of exhibiting a clean, sharp fracture, it is often flaky, rounded, and perhaps cracked by the pressure exerted upon it in the machine. If the stone is broken after delivery the waste produced by the production of dust and grit must be taken into consideration. As much as 20 per cent. may, in this way, be rendered too small for use as macadam, and can only be utilised as binding material, or for footpaths. On the other hand, there are some stones which are so hard and so wanting in any natural rift that they can only be broken economically by a machine. This is notably the case with the Bardon Hill stone. Many other stones, however, can be obtained either machine broken or hand broken, according to taste.

It is the practice of quarry owners to give the results of certain physical tests to which their stone has been subjected in order to determine its power of resistance to the different chemical and mechanical forces prevailing in a road. Although many road engineers are inclined to ignore altogether the value of such tests, it is necessary that a certain amount of space should now be devoted to their discussion, in order that their true significance may be realised and the extent to which they may be relied upon duly appreciated. This practice of submitting samples of stone to artificial estimations of their strength and durability is growing, and there is no doubt that, to a certain extent, these results are useful in the determination of the comparative value of different classes of road metal. Where such tests have been proved to disagree with experience of their actual behaviour in practice, the discrepancy must be ascribed to the imperfect methods adopted in applying them, and to the want of care exercised in making the tests truly comparative. In the first place, it will be useful to tabulate the various tests to which road stone is usually subjected, which are as follow :—

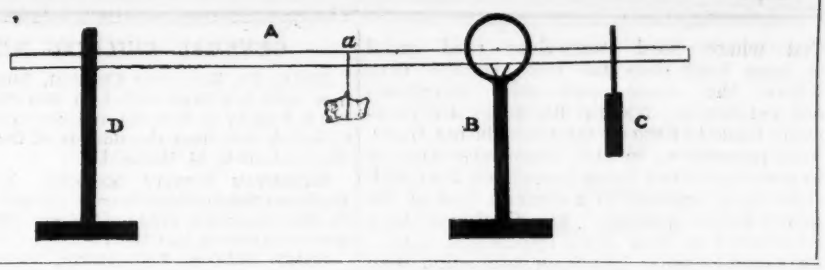
1. Specific gravity.
2. Absorptive power.
3. Abrasive resistance.
4. Weathering tests.
5. Percussion tests.
6. Compressive strength.
7. Chemical analysis.
8. Mineralogical analysis.
9. Observations under actual wear.

The last-named test can scarcely be called physical in the ordinary sense; but observations and comparisons of actual wear, when properly and scientifically made, are truly experimental, and are amongst the most useful tests to which road-stone can be submitted. We will now proceed to the consideration of these tests in turn.

Specific gravity.—It is useful to know the weight of road stone for two reasons. In the first place it may serve to some extent as an index to its durability; and, secondly, it is a means of estimating covering power. The weight of stone is sometimes expressed by stating the number of cubic feet in a ton of the substance, but this method is not so generally useful as the statement of its specific gravity, which is readily determined from a small sample, whatever may be its size and shape, without the aid of a delicate and expensive weighing apparatus.

Specific gravity is best estimated by a simple instrument known as Walker's balance, the essential features of which are shown in the accompanying figure. A is a steel bar which is supported in the rest B by a knife edge placed about 3 in. from one end. The rest of the bar, about 18 in. in length, is graduated into tenths of inches starting from the point of support. The short arm carries the weight C, which can be placed at any convenient distance from the fulcrum. The long arm passes through a looped upright D, which not only serves to check undue swinging, but also by a mark to indicate the horizontal position obtained when the weight C is exactly counterbalanced by the sample to be tested, suspended as at *a*. When a correct balance is attained the distance of *a* from the fulcrum is read off on the graduated bar. Without moving the weight C, the sample is now immersed in a glass of water, taking care that the immersion is complete and that no air bubbles remain hanging to it. The specimen, being now lighter, must now be moved farther along the beam to restore equilibrium Let the new position be *b*. Then by the principle of the lever the distances *a* and *b* are inversely proportional to the weights of the substance in air and in water respectively. Now the specific gravity, G, is the weight of the sample in air, divided by the difference of the weights in air and water. Hence it is obvious that

$$G = \frac{b}{b-a}$$



Since the results obtained by this simple means are correct to the first decimal place, and often even to the second place, the determination of specific gravity is thus readily made.

Specific gravity depends upon the mineralogical composition and compactness of a rock; but a high specific gravity does not necessarily imply superiority for road-making purposes. For example, a piece of clay slate would be found to possess a higher specific gravity than a piece of flint, but the former is perfectly useless as a road metal. It has already been shown that the igneous rocks show a higher specific gravity in proportion as their basicity increases—that is to say, as their silica percentage diminishes. In general, the crushing strength of road stone increases with its specific gravity, as may be inferred from a consideration of the following specific gravities of some well-known materials :—

	Specific Gravity.
Penlee stone	3·02
Guernsey syenite	2·91
Whinstone	2·9
Clee Hills basalt	2·88
Penmaenmawr stone	2·73
Mount Sorrel granite	2·7
Mountain limestone	2·69
Cherbourg quartzite	2·68
Pennant grit	2·68
Hartshill quartzite	2·65
Kentish rag	2·64
Flint	2·63

The above values must not, however, be taken as absolute. To obtain correct average values it would be necessary to make a large number of determinations of different samples of each stone.

Let us now see how far specific gravity influences the covering power of macadam.

Knowing its specific gravity it is easy to calculate the number of cubic feet in a ton of road stone. Taking the weight of water as 1,000 ozs. per cubic foot, the number of cubic feet in a ton of stone having a specific gravity of 2·9 is $\frac{2{,}240 \times 16}{1{,}000 \times 2{\cdot}9}$ or 11·9.

Now broken stone occupies more space than the same material in the solid state. It has been estimated that stone broken to 1½ in. has 51 per cent. of interstitial vacant space and only 49 per cent. of solid material. Similarly, if broken to 2½ in., there is 41 per cent. of vacant space and 59 per cent. of solid. If the size is not uniform—that is, if stone is broken to large and small pieces—there is more solid and less void, while, if beaten down, the proportion of solid also increases. We may take 55 per cent. as the average proportion of solid stone in broken macadam, in which case the weight of a cubic yard will be the weight of the stone in pounds per cubic foot × 27 × ·55; that is to say, it will be equal to

$$\frac{\text{specific gravity} \times 1{,}000}{16} \times 27 \times {\cdot}55.$$

The average quantity of macadam required per annum for the repair of roads may be roughly taken as 100 cubic yards per mile, although this quantity varies within very considerable limits in special cases. But if we take into consideration the specific gravity of the stone, we shall find that whereas 100 cubic yards of basalt, having a specific gravity of 2·99, will weigh 124 tons, the same quantity of a sandstone, with a specific gravity of 2·4, will only weigh 92 tons. That is to say, 92 tons of sandstone will be equal in covering power to 124 tons of basalt.

Thus, generally speaking, the heavier stone will be the more expensive.

These figures are given for the purpose of illustrating the influence of even small differences in specific gravity when large quantities of material are in question. Specific gravity, therefore, assumes considerable importance in the matter of selection of road material.

Absorptive Power.—Few of the properties of road stone are of greater importance than the capacity which it has for absorbing moisture. Just as the specific gravity of a rock is influenced by the compactness of its texture, so its absorptive power is also dependent upon the amount of interstitial space between the mineral grains, and is, therefore, a guide to the closeness of their aggregation. The behaviour of the stone on weathering is also influenced by its absorbent qualities. The expansion of water on freezing renders porous stones especially liable to disintegration by frost. Frost expands the moisture not only in the crust of a macadamised road, but also in the materials themselves, and it is shown by experience

that where hard impervious road metal is used frost does far less damage than where the more permeable limestones are employed. Natural flagstones are especially liable to flake or laminate during frosts. This property is, in fact, taken advantage of in working certain fissile limestones, the rough slabs being exposed to a winter's frost at the quarry before splitting. The Caithness flags, on account of their more impervious nature, are found to suffer less from lamination than the more absorbent flags of Yorkshire. There is another point as regards absorptive power which should not be lost sight of, that is, its influence on public health. In these days of advanced sanitation a considerable amount of attention has been given to the question of the propagation of diseases by street refuse. The absorptive powers of wood pavements are for this reason considered as one of the greatest objections to the use of wood for town streets.

Lastly, there is a certain connexion between absorptive power and the crushing resistance of a rock. This would follow naturally from the relationship which has already been shown to exist between absorptive power and compactness of texture. If we arrange a series of rocks in the order of their absorptive power, this same order will give also their comparative resistance to crushing with an accuracy which for practical purposes may be often useful in forming a rough idea of the value of any particular stone.

The absorptive powers of stone vary within wide limits. The igneous rocks are the least absorbent, and the limestones show the highest tendency to imbibe moisture. The following are some results of experiments on stones of different kinds :—

Granites absorb from ·8 to ·1 per cent. of their weight.

Basalts average about ·3 per cent. of their weight.

Sandstones vary from 8·5 to 2·7 per cent. of their weight.

Limestones vary from 4 to 12 per cent. of their weight.

The average absorption of sandstone is about 5 per cent. Good bricks should not absorb more than 7 per cent., but many inferior bricks show results as high as 16 per cent. Fire bricks average about 9 per cent., while highly vitrified bricks may have as low an absorption as 2·3 per cent.

These results are given merely for the purpose of giving a general idea of the limits between which stones may be expected to vary in this respect, it being always remembered that a high absorptive power indicates an inferior stone as far as road material is concerned.

It is not necessary to use a delicate balance in the estimation of the proportion which the absorbed water bears to the weight of the sample of stone. This can be determined with sufficient accuracy by means of Walker's balance described above. The sample is first balanced by the counterpoise in any convenient position : let this position be represented by a divisions of the scale. It is now soaked in water for twenty-four hours, then removed, and the superficial moisture wiped off. Being now heavier, it will balance nearer the fulcrum, at a position represented by b divisions of the scale. If x is the unknown weight of the sample and c the weight of absorbed water, we have, by the principle of the lever, $\frac{x}{x+c}=\frac{b}{a}$; whence $\frac{c}{x}=\frac{a-b}{b}$; that is, the fraction $\frac{a-b}{b}$ gives the ratio of the weight of absorbed water to the weight of the substance. The percentage absorption is represented by multiplying this fraction by 100. Thus in a special case it was found that the fraction $\frac{a-b}{b}=\frac{1}{20}$ nearly, which corresponds with an absorption of 5 per cent., this result being arrived at without knowing the weight of the stone either before or after immersion.

These two properties of a rock, viz., specific gravity and absorptive power can, therefore, be readily determined by means of the same simple apparatus.

ROMAN CATHOLIC CHURCH, WEST STANLEY.—On the 2nd inst. the foundation stones of a new Roman Catholic church, dedicated to St. Joseph and the Sacred Heart, were laid at West Stanley, near Newcastle-on-Tyne. The edifice will seat about five hundred persons. It is to be built of stone, and has a shield roof. The contractors are Messrs. Mordue & Johnson, of Dipton; and the architect, Mr. Charles Walker, of Newcastle.

GENERAL BUILDING NEWS.

AISLE, ST. VINCENT'S CHURCH, SHEFFIELD.—A new aisle has been added to this church. It is 100 ft. long by 22 ft. broad, and was built by Messrs. O'Neill & Son from the designs of the architects, Messrs. C. & C. M. Hadfield.

WESLEYAN SUNDAY SCHOOLS, YORK.—New Wesleyan Sunday Schools were opened recently in St. Nicholas-street, Hull-road, York. Mr. E. Taylor was the architect, and Mr. Turner the builder.

BOARD SCHOOL, GREETLAND, YORKS.—A new Board school, with accommodation for 266 scholars, was opened at Greetland on the 5th inst. The school has been erected from plans prepared by Mr. W. E. Williams, architect, Halifax.

HALL, LOUGHBOROUGH, LEICESTERSHIRE.—A temperance hall and café is in course of erection at the corner of the Cattle Market and Granby-street, Loughborough. The memorial stones were laid recently. The building will consist of a public hall, 57 ft. by 31 ft., to seat about 500 persons, retiring-rooms, billiard-room, &c., and the café. The architect is Mr. Albert E. King. Messrs. Main, Kendall, & Main are executing the brickwork, and the woodwork is by Mr. W. Corah.

POLICE BUILDINGS, BARNSLEY.—Col. A. G. Durnford, R.E., an Inspector to the Local Government Board, recently held a public inquiry at the Town Hall, Barnsley, relative to an application of the Town Council to borrow 1,752*l.* for the provision of police buildings and a courthouse. The Borough Surveyor, Mr. J. H. Taylor, explained the nature of the buildings proposed to be erected.

FREE CHURCH HALL, CATHCART, N.B.—This hall, which was opened on the 31st ult., has two principal fronts, one to Newlands-road, and the other to a recently-made street. That to the new street is gabled and filled in by small three-light windows flanked by buttresses. The main entrance is by a boldly-moulded and splayed doorway in a porch which occupies the easternmost bay of the Newlands-road front. The other four bays are filled in by one-light traceried windows. The external stonework is from Locharbriggs, and the roofs are covered with Aberfoyle green slates, finished with red tiles. The hall is roofed in one span. The internal woodwork is of stained silver grey, flat finished, and the windows are filled in with amber-tinted cathedral glass, with white muranese border. The seating is movable, and provides for 370 people. The vestry, ladies'-room, and other accommodation are in the wing at the pulpit platform end. The work was carried out from designs by Mr. J. Hamilton, architect, Glasgow. The following were the contractors :—Messrs. Alex. Robertson, mason work; Maben & Co., joiners; Hendry & Son, plumbers; Gray & Co., plasterers; John Anderson, slater; A. M. Simpson, glazier; M'Culloch & Co., painters; Osbert Henderson, gas fittings; Bennet Furnishing Company, seating; Combe & Co., heating.

FISH MARKET, SWANSEA.—The Swansea Steam Trawling, Ice, and Cold Storage Company are about to have an ice factory, capable of producing thirty tons of "can" ice per day, erected on the East Dock embankment, Swansea. The plant and buildings are estimated to cost 22,000*l.* The buildings for cold storage which have already been commenced consist of four floors, 50 ft. high, which will contain a space of 120,000 cubic ft., 60,000 ft. of which will be isolated at first, and the remaining portion subsequently. Messrs. Freeman, Sons, & Gaskell, of Hull, are the architects. The Swansea Harbour Trustees have adopted the plans subject to a few modifications. Including the necessary dredging, this building will cost 15,000*l.* There are provided railway and siding accommodation for the bunkering of the trawlers and for the despatch of fish.

DRILL HALL, ABERDEEN.—The drill-hall and offices of the 1st Aberdeen Artillery Volunteer Corps in North Silver-street are nearing completion. The building is three stories in height. On the ground floor are the officers' rooms to the right hand side on entering. The clothing store, armoury, store-room, offices, and commanding officers' business apartment are also on this floor, and have been furnished for the proper storing of the carbines, kits, great coats, and general stores for the position and garrison batteries. The large hall, 150 ft. by 50 ft., will be used exclusively for company drill and for other assemblies. Adjoining this are two other halls to be used for the position battery and garrison company gun-drill respectively. Provision is being made for the garrison guns on concrete platforms, now in course of being laid down. On the first floor there is a large hall, to be utilised for lectures and social functions. On this floor there are also three reading and recreation rooms and two rooms for the sergeants' mess. On the third floor there is a large store for the men's great coats and other equipment, with a smaller room for the saddlery. On the north-west side of the building is the caretaker's house, which has four rooms. In order that the noise may be deadened, if not altogether obviated, when gun drill is going on immediately underneath, the floors are of concrete, with a top covering of pitch-pine blocks. In an underground chamber a large upright boiler is located, which is to be utilised for the heating of the place by means of hot-water pipes. The architect is Mr. Alex. Mavor, of Aberdeen.

WAREHOUSE, ABERDEEN.—The warehouse erected at Millbank, Berryden-road, by the Northern Co-operative Company, Limited, was opened on the 2nd inst. The building has been so constructed internally as to give the greatest possible amount of storage, and at the same time enable the goods to be expeditiously handled. The establishment has been provided with a complete system of hoists and lifts worked by electricity, while provision is made for having the interior lighted by electricity. The motive power is supplied by the company's own electric installation, and the plant has been provided by Messrs. H. Wilson Baggot, & Co. Approximately the cost of the establishment is 10,000*l.* The contractors were Mr. Leslie Smith, builder; Mr. Alexander Hall, joiner; Messrs. Adam & Co., slaters; Messrs. Thom & Strachan, plumbers; Mr. George Leith, plasterer; and Mr. John Williamson, painter. The architect is Mr. R. G. Wilson, of Aberdeen.

FACTORY BUILDINGS, DUNFERMLINE, N.B.—Messrs. Andrew Reid & Co. are about to have a large addition made to their power-loom works in Dunfermline, in celebration of the fiftieth anniversary of the introduction of the loom into the town. The plans are being prepared by Mr. T. Hyslop Ure, architect, of Dunfermline.

ADDITIONS TO CHURCH, CAUSEWAYEND, ABERDEEN.—The alterations and additions to the Causewayend Free Church, Aberdeen, consisting principally of two side galleries, are now practically completed. The galleries are supported by nine iron pillars with ornamental capitals. The contractors were :—Messrs. D. Macandrew & Co., Loch-street, joiners; Messrs. Gordon & Watt, Woolmanhill, painters; Mr. Robert Tindall, heating apparatus; Mr. John F. Anderson, Bridge-street, plumber; and Mr. D. Souttar, Rosemount, upholsterer; while Mr. R. G. Wilson, of Aberdeen, is the architect.

EDUCATIONAL BUILDINGS, BLAYDON-ON-TYNE.—The Lord-Lieutenant of Northumberland performed the opening ceremony of the new educational buildings erected by the Blaydon District Industrial and Provident Society, Limited, on the 30th ult. They are of red brick with stone dressings, and the site abuts on the Shibdon-road and Mary-street. The frontage to Shibdon-road is 113 ft., and that to Mary-street 71 ft. The ground floor comprises reading-room, library, billiard, and games-rooms, refreshment-rooms, kitchen, staircases, lavatories, &c., the entrance to these rooms being from Shibdon-road. The entrance to the assembly hall, on the upper floor, is from Mary-street. It is 65 ft long by 44 ft. wide, and 24 ft. high, with platform or stage at the end, which is 24 ft. by 20 ft. On either side of the stage are placed retiring-rooms, with lavatory accommodation to each. A special exit at the side of the hall into the back street has been arranged in case of fire or panic. Off the main staircase landing are placed the cloak-rooms, with lavatories, and at the rear is a kitchen. A caretaker's house is attached, consisting of kitchen, scullery, sitting-room, and two bedrooms. The rooms are all well lighted, and special provision has been made as regards ventilation and extraction of foul air from each room. The heating will be by steam throughout. The contractors for the masonry and brickwork were Messrs. Davison & Bolam, Blaydon; joiners' work, R. Thompson & Co., Blaydon; plumbing, F. W. Jefferson, Ryton; slating, H. Moat & Son, Newcastle; plastering, T. Rule, Gateshead: painting and glazing, W. Smith, Winlaton; steam heating, H. Walker & Son, Limited, Newcastle; seating, the North of England School Furnishing Company. The joint architects for the buildings were the late Mr. T. C. Nicholson, of Blaydon, and Mr. Edwin Bowman, County Chambers, Newcastle. The cost, including land and fittings, will be about 6,000*l.*

SCHOOL BUILDING, BUTTERKNOWLE, DURHAM.—On the 30th ult. the foundation-stone of the school building which is being erected in connexion with the Wesleyan Methodist chapel at Butterknowle, near Bishop Auckland, was laid. The building is to consist of one large school-room and a side room The architect is Mr. F. H. Livesey, of Bishop Auckland.

HALL, TAIN, ROSS.—The foundation-stone of an Oddfellows' Hall was laid recently at Tain. The architect is Mr. James Maitland.

ADDITIONS TO HOSPITAL, GOOSNARGH, NEAR PRESTON.—The extensions and alterations to this hospital will shortly be completed. A new east wing, which has been built, greatly increases the accommodation. The old portion has been rearranged, new corridors are run from one end to the other, and all the apartments have been made larger. The work of altering and enlarging the hospital was commenced in October, 1897. In taking down the joists, the decayed state of the old walls rendered it necessary to take the greater part of them down, redress the stones, and rebuild. This was especially the case with the front of the building, so that, with the exception of the west wing, the whole of the structure looks new on the outside. The inside is re-modelled entirely, and is made to harmonise with the new wing, where the governor will have his quarters, and the staff will be at the same end. The old staircases have disappeared, and one of the features of the renovated building will be a large central staircase of Dantzig oak. On the ground floor is a large room, which will be known as the gentlemen's

sitting-room. There are also a spacious dining-room, smoking-room, and reception-room. Immediately over the sitting-room, on the first floor, is the ladies' sitting-room, of the same dimensions. The floors are plugged with slag wool so that no movement on the first floor will be heard on the ground floor. There are altogether thirty-two bedrooms, including those for the governor and the staff of servants. Several bath-rooms and lavatories are provided, and the building is fitted throughout with the electric light. There is an iron staircase or escape from the upper part of the building in case of fire. The old laundry has been converted into a fever ward, and there is a large apartment which can be divided by means of a sliding partition and made into two sick-rooms if necessary. These rooms and the fever-ward are so situated as to be easily isolated from the other part of the establishment when required. The cost of the whole is estimated at from 14,000*l.* to 15,000*l.* Messrs. T. Croft & Sons are the sole contractors, but the woodwork and joinery have been done by Mr. George Hill, of Cannon-street, the painting and plumbing by Mr. Marsden, of Lancaster-road, Preston, and the plastering by Mr. Foster, of Padiham. The electric light system is Verity's, Manchester, and the installation with dynamo, accumulators, and cells has been carried out by Mr. Dewhurst, electrical engineer, Fishergate, Preston. The architects are Messrs. Garlick & Sykes, of Preston.

PUBLIC BATHS, CORK.—Mr. P. C. Cowan, Chief Engineering Inspector to the Local Government Board, held an inquiry in the Municipal Buildings, Cork, on the 30th ult., relative to an application made by the Cork Corporation for a loan of 6,100*l.*, for the purpose of erecting public baths in the city. Mr. Cutler, the City Engineer, stated in his examination that he had prepared plans for the baths which it was proposed to erect in Eglinton-street, at the rear of the Municipal buildings. The present scheme consisted of the construction of two swimming baths, 75 ft. by 30 ft. each, with a depth of water of from 3 ft. 6 in. to 6 ft. 6 in. Adjoining the swimming baths it was proposed to construct nine douche baths in separate rooms—baths with a kind of spray with hot and cold water. These were to be conveniently arranged so that persons of the coal-porter class could first have a douche bath and then a proper swim. There were to be nine of these in each bath, or eighteen altogether. There would be two entrance halls with an office to each, and a hall for dry bathing dresses for each. At the end of each bath there would be a steam generator to keep the water up to the temperature of from 72 to 74 deg. Steam pipes would be arranged above the bathing boxes for heating the air of the room and preventing condensation. Pipes would be led from these heaters underneath the seats. It would be provided that the temperature of the water could not be raised above 85 to 90 deg. The douche baths would have combination cocks, so that either hot or cold water or a combine could be used. The boiler would be a 20 h.-p. boiler, to be worked at a pressure of 70 lbs. The chimney would be 60 ft. high. Over the top of the boiler-house it was intended to construct a laundry, the machinery of which would be driven by a small 10 h.-p. engine, supplied with steam from the boiler. The estimated cost was 6,100*l.*, which took in everything mentioned in the plans. It was intended to construct the building with rubble masonry, except the front, which would be of brick. The dressings it was proposed to construct of concrete. To the height of 4 ft. 6 in. of the inside would be of glazed bricks, or, in the event of their not getting satisfactory bricks, they would have to resort to tiles. The bottoms and sides of the bath would also be lined with glazed bricks, the bath itself being actually constructed of concrete. The water would be supplied from the city water mains.

HOTEL TORPHINS, DEESIDE.—A new hotel has been erected at Torphins. The building is of granite and is three stories in height. The architects were Messrs. Jenkins & Marr, of Aberdeen; and the contractors were:—Mason work, Messrs. Burgess & Son, Aboyne; carpenter, Messrs. W. Duguid & Son, Ballater; plasterer, Mr. G. Merson, Banchory; slater, Mr. J. Davidson, Banchory; plumber, Mr. A. B. Robertson, Aberdeen; and painters, Messrs. Gordon & Watt, Aberdeen.

PARISH ROOM AND CHURCH HOUSE, WHITBY.—The foundation stone of a parish room and church house was laid recently at Whitby. Mr. John Braim is erecting the building, which will contain a room for meetings, 66 ft. long by 33 ft. 6 in. wide, to seat nearly four hundred people, and have a platform at the end. At the side of the room are ante and cloak-rooms, and a kitchen. The building is to be of red bricks and terra-cotta. The inside of the main room is to be lined with glazed bricks to a height of 5 ft. all round, and the roof will be of pitch-pine, varnished. The estimated cost of the building is between 1,500*l.* and 1,600*l.* Mr. E. H. Smales is the architect.

TECHNICAL SCHOOLS, &C., SOUTHEND.—Mr. W. A. Ducat, Local Government Board Inspector, held an inquiry at Southend recently concerning the proposal by the Southend Town Council to borrow 13,150*l.* towards the erection of new technical schools, and 1,850*l.* for a new fire station. Towards the cost of the school the County Council provide 5,000*l.* The Town Clerk, Mr. W. H. Snow, said the application could be divided into three heads—the necessity for the new technical schools, the appropriation of part of the Victoria-avenue estate, and the transfer of the rooms at present occupied in Clarence-road, to be used hereafter for municipal offices. Mr. H. T. Hare, the architect whose plans were selected by the Corporation, produced his drawings of the new building. He said he estimated that the work would cost 20,000*l.*, approximately. The Borough Surveyor, Mr. A. Fidler, gave evidence as to the present accommodation, and as to the site in Victoria-avenue for the proposed schools.

FREE CHURCH, CUMNOCK, N.B. — This new church, opened on the 3rd inst., is built of red sandstone from the quarries of Ballochmyle. The architect was Mr. Menzies, of York-place, Edinburgh.

GRAND THEATRE, WALSALL.—This theatre, which was re-opened on the 4th inst., has been materially altered structurally from the designs of Messrs. Owen & Ward, architects, of Birmingham. The chief alterations have been the re-arrangement and the construction of new staircases and exits, each part of the house having its own ingress and egress. The sitting accommodation is for about 1,500 persons. It is heated throughout with hot water, and the electric-lighting has been largely increased. The upholstery and decoration have been carried out by Messrs. A. R. Dean, Limited, Birmingham, the brass work, &c., by Messrs. Gilbert & Son, Park-street, and the electric lighting by Messrs. P. U. Fellows & Co., Walsall.

Y.M.C.A. BUILDING, CARDIFF.—The foundation stones of a new Y.M.C.A. building at Cardiff were laid on the 6th inst. The architects are Messrs. Jones, Richards & Budgen.

CONSERVATIVE CLUB HOUSE, GUIDE, LANCASHIRE.—A Conservative club house is being erected at Guide, and the foundation stone was laid on the 26th ult. The building will be of red brick and stone. The architects are Messrs. Sames & Green, of Blackburn and Darwen.

SANITARY AND ENGINEERING NEWS.

WATER SUPPLY, KEIGHLEY.—At a monthly meeting of the Keighley Town Council, held on the 29th ult., it was stated that at present no water whatever was flowing into the reservoir from the gathering ground, but that the store, if carefully used, would last for two or three weeks to come. The streets are being watered from a supply not used for drinking purposes. It is hoped that the rainfall of the last week will improve matters.

BRIDGE OVER RIVER ARROW, BROOM, NEAR ALCESTER.—Colonel Hepper, Local Government Board Inspector, held an inquiry at Broom, on the 31st ult. in reference to an application by the Alcester Rural District Council to borrow 700*l.* towards defraying the cost of erecting a bridge over the river Arrow. The estimated total cost is 2,900*l.*, the County Council and subscribers finding the remainder.

MAIN ROAD IMPROVEMENTS, ECCLES, LANCS.—On the 31st ult. Colonel A. G. Durnford, Inspector to the Local Government Board, opened an inquiry at the Town Hall, Eccles, into the application of the Town Council to borrow 12,200*l.* for works of main road improvements, 1,793*l.* for additional expenses incurred in extending and furnishing the new municipal buildings, 1,556*l.* for works of private street improvement, and 550*l.* for purposes of sewage disposal. The Town Clerk explained that with the consent and approval of the County Council, the Eccles Town Council proposed to reconstruct portions of Liverpool-road, Barton-road, and Worsley-road. There were four and a half miles of main roads in the borough, which have all been laid out and paved with different kinds of setts, and the County Council Surveyor had approached the Town Council with the view of having the roads constructed in a more thorough manner. The maintenance of the main roads for some years past had cost 1,900*l.* yearly, and it was thought that if they were constructed in a more permanent manner at least 200*l.* a year would be saved. There was no opposition to the several applications.

GRAVING DOCK, PORT TALBOT. — The new graving dock at Port Talbot, which has been under construction two years, was opened on the 29th ult. It is 435 ft. long, 110 ft. wide, with a 60 ft entrance. The engineer was Mr. Livsey, and the contractor Mr. Sinnott.

NEW BRIDGE, SOUTH END, ARRAN.—On the 26th ult. the bridge recently erected across Kilmory Water, in the Island of Arran, was opened for traffic. It is constructed of iron and concrete, is 50 ft. in length by about 10½ ft. in width, and is in two spans. The contractors were Messrs. Crawford & Son, builders, of Lamlash, and Mr. John Cook, joiner, of Claynod. The designs were by Mr. Mather, civil engineer to the Arran estate.

DRAINAGE SCHEME, CHIPPENHAM.—Mr. Lowan, Local Government Board Inspector, held an inquiry at the Town Hall, Chippenham, on the 6th inst. with reference to an application from the Rural District Council for power to borrow 3,004*l.* for sewerage and sewage disposal, and 1,000*l.* for land. The Surveyor (Mr. Lapham) said that it was proposed to adopt the septic system.

STAINED GLASS AND DECORATION.

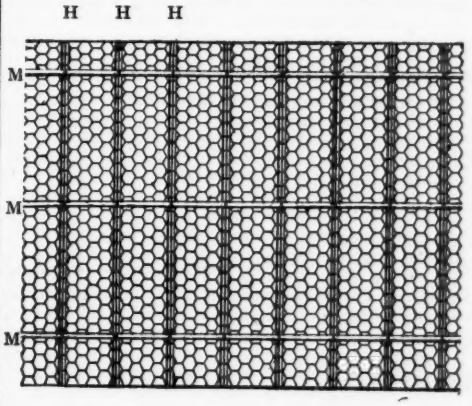
REOPENING OF VICTORIA-STREET CHURCH, DUNDEE.—This church was reopened on the 3rd inst., after painting and redecorating. Messrs. P. & A. Davie, painters, Dundee, have carried out the work, under the superintendence of Messrs. James Foggie & Sons.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENT.—Messrs. E. A. Roome & Co., builders and contractors, have removed their offices from 8, Coleman-street to 36, Basinghall-street, E.C.

ARCHITECTURAL AND BUILDING CLASSES.—We have received the annual prospectus of the King's College Architecture and Building Construction Classes, which are being continued on their old lines. The name of the Professor of Architecture is still not filled up. Messrs. Banister F. Fletcher and H. Phillips Fletcher are the Lecturers, the former being also Studio Instructor, and Mr. James Bartlett is Demonstrator.——Mr. D. Bennet Dobson (Glasgow) sends us the prospectus of the Evening Classes in Elementary and Advanced Art and Building Construction at the High School, Glasgow. These are divided into art classes (Monday, Wednesday and Friday evenings) and Science Classes (Tuesday, Wednesday and Thursday evenings), the former presided over by Mr. W. Paddock, the latter by Mr. Bennet Dobson. Certificates will be granted by the Board to all students who obtain over 25 percentage of class marks (this seems rather an easily-earned certificate), and a list of prizes is offered for various subjects.——We have received from the City of London College, White-street, Moorfields, the syllabus of lectures in the engineering department under Professor Henry Adams. These include building construction, civil engineering, sanitary engineering, quantity surveying, land surveying, theodolite work, and other branches of work connected with surveying and construction. ——The Calendar of the Glasgow and West of Scotland Technical College for 1899-1900 shows, as before, a most extended programme of instruction, in which the subjects of architecture and building construction take a large place and are under the guidance of exceptionally competent instructors. It is announced that the Agricultural Department of the College has been transferred to a separate body, to be known as the "West of Scotland Agricultural College." This is just as well, for agriculture cannot properly be grouped in the same class as the subjects usually taught in a Technical College.

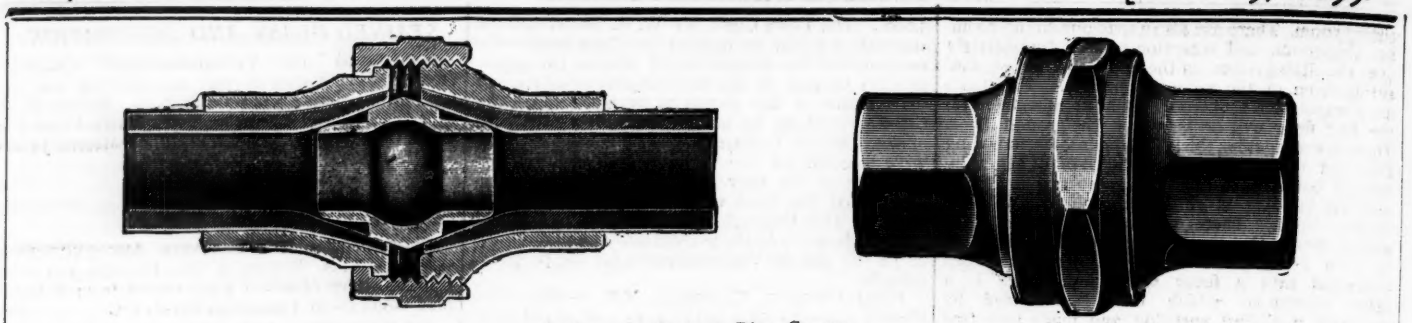
PATENT FIREPROOF WIRE LATHING.—The illustration represents a piece of Messrs. Johnson, Clapham, & Morris's patent wire lathing. The lines at H represent steel strips, ⅝ in. wide. set on edge about 5 in. apart. M represents steel strips which hold the H strips at right angles to the



Patent Fireproof Wire Lathing.

netting. By these means it is claimed that the lathing is kept perfectly rigid and does not swag or buckle, and can be fixed up in large sheets with economy of time and labour. We have not had an opportunity of examining an actual specimen of the material, but the method of putting together seems to promise well for its efficiency when fixed.

A MEMORIAL TO SIMON DE MONTFORT.—It is proposed to erect at Evesham, at an estimated cost of about 2,500*l.*, an equestrian figure of Simon de Montfort, Earl of Leicester, who fell in the battle fought just outside the town on August 4, 1265. His body, and those of his son and of Henry and Hugh le Despencer, were buried in front of the high altar of the now ruined Benedictine Abbey dedicated to St. Mary. Mr. R. A. Briggs is appointed architect of the monument, to be executed in bronze, with a grey Cornish granite base, beneath a canopy of aluminium alloy. The Abbey, originally built in 701-9, was dedicated by Wilfrid, fourth Bishop of Wessex, and at the Suppression had a revenue amounting to 1,829*l.* 10s. The buildings and site, alienated by Henry VIII., were afterwards sold, and the church demolished, but the clock tower, built by Abbot Lichfield, and fragments of the almonry, Abbot Reginald's gateway (*circa* 1130), the stables, and the chapter house have been preserved.



Anderson's Patent Pipe Coupling.

PIPE COUPLINGS.—A new pipe coupling, known as Anderson's patent, is now being introduced into this country, and as it has some good features, a description of it may prove of service to our readers. The illustrations show the coupling for joining two lead pipes; it will be seen that the coupling consists of four parts, namely, an inner double cone, two outer cones (one of which has a thread around part of its exterior), and a screwed cap or nut for drawing the outer cones together and so compressing the lead between the outer and inner cones. The coupling for joining a lead pipe to an iron pipe consists of only three pieces, two of which (the screwed cap and the plain outer cone) are exactly like those in the illustration, but the inner cone is single instead of double, and is lengthened so as to allow a thread to be formed outside to receive the cap, and another thread inside to receive the screwed end of the iron pipe. Of course, many couplings of the sort have been patented in this country, but as Anderson's coupling is simple and effective, and as it has been extensively used in America, it is well worth a trial.

THE HOUSING OF THE WORKING CLASSES.—An unexpected obstacle presents itself to the London County Council in their dealing with the provision of dwellings for the working classes. The Council have considered the question of acquiring suitable sites already inspected by them near the limits of the county area, where, in view of increasing facilities of conveyance, healthy and easily accessible houses for many thousands could be built. They prepared a case for reference to counsel seeking advice upon the question whether for purposes of Part III. of the Housing of the Working Classes Act, 1890, the Council could legally purchase and hold land outside the County of London, and erect dwellings thereon as apart from any clearance schemes effected within the county. Mr. Lawson Walton, Q.C., is of opinion that the Council possess no such power, and that the limitation to their own area, whilst not expressed, is to be gathered from the scope and object of the Act and other Acts (including "Lord Shaftesbury's" Acts, 1851 to 1885) incorporated therewith. Mr. Lawson Walton further opines that the Council are not empowered to acquire and retain land with a view to the possible ultimate erection of dwellings. The two questions were also laid before Mr. Haldane, Q.C., who replies to the same effect. For the present, therefore, the offer by Sir Samuel Montagu, M.P., of 25 acres of land at Edmonton remains in abeyance.

THE UNIVERSAL DIRECTORY OF RAILWAY OFFICIALS, 1899.—This is the fifth year of publication of this useful, clearly-arranged and well-printed directory. The work is compiled from official sources by Mr. S. Richardson, and is published by the Directory Publishing Company, Limited, Catherine-street, Strand. It contains an extensive list of the railway officials of Europe, Asia, Africa, America, and Australasia. The length of each railway follows the name, and is given in English miles, and in many instances also in kilomètres. The gauge is given in feet and inches, or in mètres. The additions made in the present edition consist chiefly of light railways and tramways.

THE ART UNION OF LONDON.—The Art Union send us a specimen of the plate which they have issued to subscribers this year. This is an etching by Mr. R. W. Macbeth, after one of the best of Mr. H. W. B. Davis's pictures, "The Banks of the Upper Wye." The etching is a fine one, and conveys a great deal of suggestion of colour, though we still think that the works of this kind issued by the Art Union are too large. The quality of an etching is not measured by its size.

THE WHITEFIELD MEMORIAL CHURCH.—The new buildings in Tottenham Court-road, planned and designed by Mr. Rowland Plumbe, are nearly completed, and the Toplady Hall will meanwhile be used for the services and other purposes of the church. The hall, on the basement floor, occupies the site of the former burial vaults, below which lies Toplady's grave, and also that of Whitefield's wife, who predeceased her husband in 1768. Toplady (*obiit.* August 11, 1778) was buried, by his own desire, in a grave 12 ft. deep, which is now filled with concrete. The original Tabernacle, designed by Whitefield himself, was begun in 1756, and enlarged five years later, with a front portion octangular on plan. In 1830, the lease having expired two years previously, the building was bought for 20,000*l.* and vested in trustees. The portico was then added and the fabric was covered with stucco. The new building has been erected at a total cost of about 12,000*l*, by Messrs. T. H. Kingerlee & Sons, of Oxford, contractors; the slating is by Messrs. Roberts & Adlard; Messrs. Welch & Fry supply the gas and electrical lighting apparatus; and the Asbestos and Asbestic Company their "Danville" fire and sound-proof asbestic plastering.

EXCAVATIONS AT WAVERLEY ABBEY.—The excavations at Waverley Abbey, the first of the Cistercian Abbeys founded in England, which were commenced last year under the superintendence of the Rev. T. S. Cooper, one of the secretaries of the Surrey Archæological Society, and which yielded such interesting discoveries, have been continued during the summer months with very satisfactory results. The main object of the Society is to obtain a complete ground plan of the Abbey buildings, which covered a considerable area; and in this, if funds are forthcoming to enable them to complete the excavations, they are likely to be successful. Considerable progress has been made in this direction during the past four or five months, the excavations, which have been almost entirely confined to what is known as the infirmary block, resulting in the tracing of the south wall for 112 ft., and the west wall for about 80 ft. Another wall was discovered running northwards, and this was uncovered, forming an oblong block of 112 ft. by 80 ft. The block was found to contain a number of small rooms and yards, the use of which it is difficult to determine at present. In one of the rooms were found the bases of five small pillars, similar to those discovered last year in the cloister, resting on a tile foundation. The infirmary kitchen has been ascertained, and the remains of a gateway opening into a courtyard. Another interesting feature of the summer's work is the discovery of some of the old lead pipes through which water from the St. Mary's well was conveyed to the Abbey. The pipes are laid in lengths of 12 ft., with collars at the junctions, and form part of the system of supplying water to the Abbey, which was carried out by Brother Symon early in the thirteenth century.—*Standard.*

ELECTRIC LIGHTING, SUNDERLAND.—On the 29th ult., at the Town Hall, Sunderland, Mr. R. H. Bicknell conducted an inquiry on behalf of the Local Government Board in reference to an application from the Corporation of Sunderland for sanction to borrow 40,000*l.* for the purpose of electric lighting. The application was made in order to provide electric power for the trams, and also for the extension of the mains for the ordinary supply of light. The Borough Electrical Engineer is Mr. J. F. C. Snell.

REREDOS, ST. JOHN'S CHURCH, LOWESTOFT.—On the 30th ult. the Rural Dean, Canon Lawrence, Rector of Lowestoft, unveiled a new reredos in St. John's Church, Lowestoft, which has been erected as a memorial of the Queen's Diamond Jubilee, and also a memorial brass in memory of the first vicar of the church. The reredos, which has been executed by Messrs. H. J. Salisbury Bros. & Davies, of London, is of English alabaster, with white marble sculptured panels and dark columns.

PUBLIC IMPROVEMENTS, SHILDON, DURHAM.—Mr. R. H. Bicknell recently held a Local Government Board inquiry respecting the application of the Shildon and East Thickley Urban District Council for permission to borrow 941*l.* for street improvements and sewerage works. The Inspector and the Surveyor to the Shildon Urban Council, Mr. C. Heslop, visited the sewage farm to inspect the tanks and the site of the proposed new ones.

PULPIT, ST. PETER'S EPISCOPAL CHURCH, FRASERBURGH, N.B.—A memorial pulpit has been erected in this church. It is of dark oak, and is octagonal in form, the faces of the octagon being carved. The makers were the Albert Work Co., of Edinburgh, the design having been supplied by Messrs. Kinross & Tarbolton, also of Edinburgh.

THE SURVEYORS' INSTITUTION.—The new President, Mr. T. M. Rickman, will entertain the members and their friends at a conversazione, to be held on October 12 and 13, in connexion with the formal opening of the new building.

NATIONAL ASSOCIATION OF HOUSE-PAINTERS.—The fifth Annual Convention of the National Association of Master House-painters is to be held at the Shire Hall, Hereford, on October 3, 4, and 5.

BUILDING TRADE, STAFFORDSHIRE.—The building trade of the district for the time of the year is good, particularly in cottage and villa residences. Bricklayers have a small percentage out of work Stonemasons are very busy. Joiners are working well all over the district, the town the worst off being Longton, where there are a few out of work. Bricklayers' labourers and general labourers are very busy, there being a good demand for this class of men. Plumbers and painters are moderately busy. In all the brick and tile yards in North Staffordshire good orders are on the books and all classes of operatives are regularly employed. At Leek the building trade keeps moderately brisk, full time being general. At Crewe trade is very good, and all classes of men in the business are working well, there being a demand for bricklayers. At Stafford business is fairly good, and employment is quite up to the average. At Cheadle, Tean, and Uttoxeter trade is exceptionally good, with every prospect of a continuance of the same for some time to come, and joiners in some instances are working overtime.—*Staffordshire Sentinel.*

THE CIVIL AND MECHANICAL ENGINEERS SOCIETY.—On Friday last week one of the visits arranged for the summer session by this Society was paid to the Bank Station of the Central London Railway. The members and visitors were received by Mr. A. J. Knowles, one of the resident engineers, who conducted the party over the works, and explained all matters of interest connected with the City section, including the methods adopted to surmount the many difficulties connected with tunnelling.

MEETINGS.

SATURDAY, SEPTEMBER 9.

British Institute of Certified Carpenters.—Visit to the works of the London County Council, Belvedere-road. 3.30 p.m.

RECENT PATENTS:

ACCEPTED SPECIFICATIONS.

Open to Opposition until October 30.

[1898] 11,506, Kumberg, Telephones. 17,939, Chapman, Means for Consuming Smoke and Utilising the Heat of Combustion in the Flues of Steam Boilers, Coppers, Kilns, Ovens, &c. 18,073, Johnson, Johnson, & Hinchliffe, Flush-out Water Closets and Flushing Apparatus. 18,173, Walker, 19,683, Waite, 20,766, Forrester. [1899] 10,152, Steiner, and 13,805, Wilson, Generators for Acetylene Gas. 19,423, Allan, Manufacture of Metallic Packing for Joints. 19,565, Sachse, Anti-vibratory Supports for Incandescent Gas or Oil Burners and Mantles. 20,166, Wood, Construction of Lubricating Dies for making Bricks, Blocks, or Tiles. 20,404, Long, Cramps for Picture-frames, &c. 20,867, Hull, Fire-resisting Window Blinds. 21,789, Keppeler, Machines for Sharpening and Setting Saws. 22,181, Highfield & Cater, Electrical Conducting Mains. 22,191, Woodier, Stair-treads, &c. 22,235, Keane, Circular-saw Guards. 22,296, Menzies, Closet seats. 22,399, Mitton, Nail-making Machines. 22,478, Hateley, Combined Deflecting Shade and Mantle Protector. 22,810, Cottrell & Napper, Cocks and Valves. 22,884, Andreas, Electrical Connexions. 22,901, Martini, [1899] 12,481, Sterne, and 13,308, Müller, Automatical and other Gas Ignition. 22,923, Williams & Zeale, Mortar and other Grinding or Crushing Mills. 24,164, Bradley, Electrical Incandescent Lamp-shade Holders, &c. 24,940, Hewitt, Locking and Unlocking Emergency Exit Doors. [1899] 513, Freed, Freed, Clink, & Reed, Electro-mechanical System for Providing Additional Security for Safes, Vaults, &c. 2,105, Adams & Burridge, an Appliance for Use in Soldering. 2,615, Willis & Bates, Cistern Balls and Floats. 3,307, Micheli, Terra-cotta Pottery, &c. 5,583, Schapler, Fire Escape Ladders. 6,082, Adams, Automatical Siphons. 8,144, Seagrave, Ladder Bases. 9,053, Gardner, Swimming-baths, Applicable also to Other Purposes. 10,210, Dickson, Disintegrating Machines. 10,342, Wegelin, Manufacture of Soot, Lamp-black, &c., of any Required Specific Gravity. 10,433, Raky, Deep-boring Apparatus. 10,546, Fitzgerald, Gas Cocks. 11,490, Möbius, Earthenware Pipes. 11,990, Hertrampf, Brick Kiln with Arrangement for Drying the Unburned Bricks. 12,150, de Lery, Incandescent Gas Burners. 13,977, Berry, Hydraulic Presses for Making Concrete Slabs, Blocks, &c. 14,128, Fickler, Apparatus for Saving Life and Property. 14,290, Frishmuth, Faucets and Similar Valvular Devices. 14,465, Davis & Others, Application of Paint and Similar Coatings. 14,602, Hoeniger, Concrete, Cement, and Similar Plates and Slabs. 14,759, Buchschacher, Closet Pans, &c. 14,763, Leitz, Drawing Boards, T-squares, and Angle Gauges. 14,962, Williams, Pipe Wrenches. 15,034, Perry & Tye, Device for Use in Teaching and Testing Model and Perspective Drawing. 15,148, Siemens & Halske, A. G., Junction Boxes for Underground Electrical Conductors. 15,232, Wolff, Oil Cans, &c. 15,310, Bjerregaard, Manufacture of Varnish.

ABSTRACTS OF PATENTED INVENTIONS.

10,140.—INCANDESCENT LAMPS: *A. Armellini & E. Kerbs.*—Around the gas attachment is an unobstructed

ring, through which passes the air supply to both the interior and the exterior of the burner, which, together with the mixing tube and the mantle, rests upon arms on the chimney holder. The parts of the chimney and burner are so proportioned that they produce a maximum draught outside the mantle without causing a difference of pressure between the mantle's interior and exterior, and the burner's outlet is free from gauze or other obstruction.

10,156.—WIRE FENCING: *M. D. Prendergast.*—The top and bottom and vertical stays are made of two wires that are turned up and down alternately to top and bottom, embrace filling-wires of cable form, and are twisted together alternately in opposite directions between the filling-wires.

10,175.—PIPE WRENCHES: *H. Lumsdon.*—The grip is effected by means of a chain, at whose one end are long links pivotted to the end of the lever handle; the chain's other end terminates in plates perforated with holes for a pin, or for the pin may be substituted hooks which engage with studs; the lever's front end is either rounded off or formed with horns.

10,224.—ROOFING TILES: *L. Stöger.*—The tiles, which are composed of cement, mixed with sand, and need not be burned, are fashioned with ribs upon their upper edges that interlock with the grooved lower edges of the tiles next above, their sides being cut away to engage with one another.

10,236.—ARC LAMPS: *W. J. L. Sandy, D. C. Bate, & T. Geer.*—The upper carbon is passed through two clutch-plates, pivotted to the arm of a sleeve and to a rod; the sleeve forms or carries the core of a series solenoid that tends to raise the sleeve, carbon, and clutch, the sleeve sliding as a piston in the solenoid, which serves as a dash-pot; at the descent of the sleeve a plate stops the rod, and the clutch frees the carbon.

10,263.—ANTI-FOULING PAINTS AND COMPOUNDS: *T. Turnbull.*—An admixture of crude naphtha, sifted whitening, and dissolved Para rubber is added to pitch and resin, which have been melted together.

10,316.—A COMBINED COVER FOR A SEWER INLET AND KERB: *G. P. Gross.*—The frame is provided with a flange having a rib and webs around three of its sides, and a separate hollow flange with dowel pins. To the frame is fitted a hollow kerb pierced with holes for the pins, a rib, a protecting rim, and holes for pins upon the cover, which is strengthened with ribs, and is laid upon the ribs of the flange and the kerb, kerbstones, or timbers, fastened with screws or bolts, fit into the open ends of the kerb-piece.

10,381.—SIPHON DISCHARGE: *O. Crane.*—In a well at the bottom of the cistern is fitted a stand-pipe over which slides the siphon's long leg. After the siphon has been raised and then allowed to fall, the flush is effected by the forcing of the water contained in the well over the crown of the siphon.

10,387.—GUARDS FOR WOOD-PLANING MACHINES: *F. Love.*—Over the cutters of a wood-planing or moulding machine having a vertical cutter spindle is placed an arched or curved plate fixed to the bench by a bracket whose upper end is fixed to the plate with a screw and slot, notches to admit the wood being cut in the sides of the plate, and a slotted bracket adjusts a curved plate over the end of the arch.

10,440.—ELECTRICAL COUPLINGS: *A. L. Davis.*—The arc lamps, &c., hang by cords and pulleys from brackets or ceilings; the top piece, carrying the pulley, has a cover and two concentrical tubes with bases and binding screws secured on the top-piece with insulated bolts and intervening mica plates, and the inner tube is lined with an insulating material; the hook which holds the lamp has two insulated tubes fitted with binding screws for making a connexion with the two concentrical tubes of the cover.

10,471.—TREATMENT OF SEWAGE AND IMPURE WATERS: *G. C. Purvis.*—The filtering material is laid in channels formed in the filter bed and communicating with air shafts; the bed, constructed more or less beneath the ground, is filled with gravel, sand, coke, and burned clay, or other suitable materials, and may be made in sections with the materials graded so that the finer parts lie towards the remoter ends of the sections.

10,556.—SEALED TRAPS FOR USE IN TESTING OR FLUSHING SEWERS: *W. Boydell.*—The opening in the trap to the sewer is sealed with a bell to be removed when the sewer is to be flushed, a nozzle being attached, and a hose from the water main is fastened on to the branch; the nozzle will serve when a smoke test is used, or foul air is to be expelled from the sewer.

10,587.—LIFT VALVES: *H. Burkli.*—A case, in which is fitted a nozzle, is fastened on to the inlet pipe's screw-threaded end, inside the head-piece of the nozzle is a screw-thread which engages with the end of the inlet-pipe, and outside it is a screw-thread to receive the discharge cone, between which and the case is fixed a rosette pierced for the flow of liquid and having a central hole for the spindle of the washer cap which presses against the end of the inlet pipe and so cuts off the supply.

10,617.—ELECTRICAL SWITCHES: *H. K. Smith & J. Eck.*—The switches are arranged to control groups of circuits in succession. A drum, pierced with a series of holes for receiving contact-studs, is joined through a spring contact to one end of the circuits that are to be brought under control, whilst the other ends of the circuits are joined to contact-springs which engage with the studs as the drum rotates. A reciprocating plate can be used instead of a drum.

10,619.—A MITERING APPLIANCE: *G. Clemens.*—The appliance is devised to hold the work and guide the saw for cutting a mitre or similar work at any angle desired; an angle-iron, that may be adjustably set to the angle, clamps the work, and is pivotted in a fork which also is pivotted upon a vertical axis; the angle-iron is clamped, at its other end, to a slotted arc which is clamped at any angle on the table with a bolt, the arrangements for guiding the saw rollers are mounted in a sliding casing which enables the latter to descend as it cuts. An outer frame that supports the saw-guide may be set at an angle upon a horizontal rod raised or lowered by means of two vertical rods, whose frame may also be pivotted upon a vertical axis.

10,639.—A SOLDER: *A. Homer.*—A preparation of solder is made and combined with a flux, in order that it may be used independently of the customary special appliances, it is composed of an alloy of tin, bismuth, and lead, strips of the alloy are coated on one side with resin and chloride of zinc, they are then bent back upon themselves and again rolled into the required shape in readiness for use.

10,658.—PLASTER OF PARIS: *W. R. Johnson & G. Nichols.*—The plaster is obtained from moulds that have been used, or similar waste composed thereof, by breaking up the material and burning the lumps in a kiln, dilute sulphuric acid is then sprinkled over the lumps when they are partly cool. When dry they are ground to a powder, which is heated moderately, and, lastly, cooled and stored for use. In place of sulphuric acid may be employed either alum or sulphate of potash.

10,672.—CONCRETE AND IRON FLOORS, CEILINGS, ROOFS, STAIRS, AND SIMILAR STRUCTURES: *J. Mueller.*—The floors, &c., are built up of zig-zag iron strips, which are laid upon their edges, and are joined together with clamps or bands and straight bars. Concrete, rammed in the framework, is supported with boards, or centering, until it has become properly set. The bars and strips are curved for arched floors, &c., and the straight bearing-bars, being rectangular, or angular, or T-shaped in section, rest upon the flanges of girders or similar supports.

PRICES CURRENT OF MATERIALS:

WOOD.*

Per Petersburg standard hundred.

	£	s.	d.	£	s.	d.
White Sea: first yellow deals	17	5	0	18	5	0
Second do.	13	10	0	15	0	0
Third do.	11	15	0	13	0	0
Battens, 40s., 30s., and 15s. less respectively.						
Petersburg: first yellow deals	14	0	0	16	10	0
Second do.	11	0	0	12	10	0
Battens, 30s. and 20s. less respectively.						
Petersburg, white deals	10	0	0	12	0	0
Do. white battens	8	15	0	10	5	0
Riga, white deals	8	10	0	9	10	0
Swedish mixed yellow deals	13	10	0	17	0	0
Third do.	12	10	0	15	0	0
Fourth do.	11	0	0	12	0	0
Fifth do.	10	0	0	11	0	0
Battens, 30s., 20s., and 10s. less respectively.						
Whitewood, 10 to 20 per cent. less.						
Finnish unsorted yellow deals	10	0	0	10	10	0
Battens, 10s. and 5s. less respectively.						
Whitewood, 5 to 10 per cent. less.						
Norwegian second yellow battens	7	10	0	8	0	0
Third do.	7	0	0	7	10	0
Fourth do.	6	10	0	7	0	0
Whitewood, 10s. less.						
Danzig, Crown Deck deals, per 40 ft. 3 in.	0	15	0	1	5	0
Brack	0	12	0	1	0	0
St. Lawrence Pine deals, &c., per P.S.H.:—						
1st, Bright and Dry, regular sizes	20	15	0	27	5	0
" " oddments	13	15	0	20	10	0
2nd " regular sizes	15	15	0	19	0	0
" " oddments	11	5	0	14	15	0
3rd " regular sizes	9	15	0	11	5	0
" " oddments	8	5	0	9	5	0
4th " regular sizes	8	0	0	8	15	0
" " oddments	7	5	0	8	0	0
St. Lawrence Spruce deals, &c.						
First, regular sizes	9	0	0	11	0	0
Second "	7	15	0	8	15	0
Third "	7	10	0	8	5	0
Fourth "	6	10	0	7	5	0
Oddments and battens at 20s., 10s., 7s. 6d., and 5s. less respectively.						
New Brunswick Spruce deals, &c.	7	10	0	8	5	0
Oddments, battens, and fourths	6	15	0	7	15	0
United States pitch pine planks and boards	8	15	0	12	5	0
Prepared Boards, per square						
1½ by 6½ and 7 in. 1st yellow		11	0		15	6
" " 2nd "		7	0		11	3
1 by 6½ and 7 in. 1st "		10	3		11	9
" " " white		8	0		10	3
" " 2nd yellow		8	0		10	3
" " " white		6	3		8	0
¾ by 6½ & 7 in. 1st & 2nd yellow		7	9		8	9
" " " white		7	0		8	3
¾ by 6½ and 7 in. 1st yellow and white (grooved, tongued, and beaded)		7	9		8	6
¾ by 6½ and 7 in. 2nd yellow and white (ditto)		7	3		8	0
⅝ by 6½ and 7 in. 1st yellow and white (ditto)		5	9		6	9
⅝ by 6½ and 7 in. 2nd yellow and white (ditto)		4	9		5	9
Narrower widths at 10 per cent. less.						
3rd quality at 15 per cent. less than 2nd.						
Danzig and Memel Fir Timber— per load						
Best middling	3	0	0	3	5	0
Good middling and Second	2	10	0	3	0	0
Common middling	2	5	0	2	10	0
Undersized	2	5	0	2	15	0
Swedish and Norwegian Balks	2	5	0	2	10	0
Baltic Oak Timber—						
Danzig and Stettin—Large	3	0	0	3	10	0
Small	1	15	0	2	0	0
Quebec Timber per load						
Yellow Pine	5	0	0	6	15	0
Oak	4	2	6	6	0	0
Elm	4	12	6	5	5	0
Ash	3	15	0	4	15	0
Birch	2	12	6	4	10	0
New Brunswick, &c., Birch	1	10	0	2	2	6
American Pitch Pine Timber	3	7	6	3	17	0
Wainscot, per log, 18 cubic ft.—						
Crown (Eng. & Dutch) nominal	3	17	6	5	10	0
Brack nominal	3	2	6	4	2	6
Lathwood, per cubic fathom—						
Petersburg	4	0	0	6	10	0
Riga and Danzig	4	10	0	5	10	0
Norway Poles, per ft. run	0	0	1	0	0	1½
Oak Staves, per mille full size pipe						
Memel, Crown	210	0	0	220	0	0
Brack	180	0	0	190	0	0
Danzig	165	0	0	175	0	0
Bosnia, single Barrel (nominal)	28	0	0	30	0	0
United States, Pipe	35	0	0	42	10	0
Hogshead, extra heavy and double extra	27	10	0	32	10	0
Indian Teake per load	11	10	0	16	10	0
British Guiana Greenheart	0	0	0	8	0	0

* The prices named are for the wood as imported and landed in the docks. Ten per cent., approximately, should be added in order to arrive at the current trade prices.

PRICES CURRENT—*continued.*

	£	s.	d.	£	s.	d.
Mahogany, per foot superficial—						
Honduras, cargo average	0	0	4½	0	0	6
Nicaragua, do.	0	0	4½	0	0	5½
Tabasco, do.	0	0	4	0	0	6½
Mexican, do.	0	0	3½	0	0	4
Panama, do.	0	0	3	0	0	4
African, do.	0	0	3½	0	0	5
Cuba, do.	0	0	5½	0	0	7½
St. Domingo, do.	0	0	5	0	0	7
Do. Curls (good to prime)	0	0	9	0	1	3
Walnut, American (logs)	0	2	3	0	4	6
Do. do. (planks and boards)	0	2	0	0	7	6
Italian, per foot superficial	0	0	3	0	0	7½
Black Sea, per ton	6	0	0	12	0	0
Satin Walnut (logs) per foot cube	0	1	0	0	1	3
" (planks and boards)	0	2	0	0	2	9
Sequoia (Californian redwood), per foot cube	0	1	9	0	2	0
Whitewood, American (logs)	0	1	3	0	1	6
" " (planks and boards)	0	1	6	0	2	9
Quartered oak " " "	0	2	3	0	4	0
Kauri pine (logs)	0	1	9	0	2	0
" " (planks)	0	2	3	0	2	9
Jarrah (planks)	0	2	3	0	2	6
Lancewood spars each, fresh and large	0	5	0	0	8	0
Lancewood spars, ordinary to fair	0	4	0	0	5	0
Degame spars	0	8	0	0	10	6

METALS.

		£	s.	d.	£	s.	d.
IRON—Pig, in Scotland	ton	3	9	1	0	0	0
Bar, Welsh, in London		6	0	0	6	5	0
Do. do. at works in Wales		5	15	0	5	17	6
Do. Staffordshire, in London		6	5	0	7	10	0
COPPER—British cake and ingot		81	0	0	81	10	0
Best selected		81	10	0	82	0	0
Sheets, strong		86	0	0	88	0	0
Chili bars		76	18	9	0	0	0
YELLOW METAL	lb.		6½d.			7½d.	
LEAD—Pig							
Spanish	ton	15	5	0	0	0	0
English Com. Brands		15	10	0	0	0	0
Sheet, English, 6 lbs. per sq. ft. and upwards		16	10	0	0	0	0
Pipe		17	0	0	0	0	0
ZINC—English sheet	ton	28	0	0	0	0	0
Vieille Montagne		29	0	0	0	0	0
Spelter		23	10	0	24	0	0
TIN—Straits		142	5	0	0	0	0
Australian		142	10	0	143	0	0
English Ingots		145	0	0	146	0	0
Banca		0	0	0	0	0	0
Billiton		0	0	0	0	0	0

OILS.

		£	s.	d.	£	s.	d.
Linseed	ton	21	7	6	0	0	0
Cocoanut, Cochin		29	5	0	0	0	0
Do. Ceylon		25	15	0	0	0	0
Palm, Lagos		24	0	0	0	0	0
Rapeseed, English, pale		24	15	0	0	0	0
Do. Brown		23	5	0	0	0	0
Cottonseed ref.		17	15	0	18	15	0
Oleine		17	5	0	19	0	0
Lubricating U.S.		0	5	9	0	7	9
Do. Black		0	5	0	0	6	0
TAR—Stockholm	barrel	1	6	6	0	0	0
Archangel		1	0	0	0	0	0
Turpentine		33	5	0	0	0	0

SOME RECENT SALES OF PROPERTY

ESTATE EXCHANGE REPORT.

August 12.—By YOUNG & HOWES (at Bath).

Norton St. Philip, Somerset.—Upper Farm, and 111 a. 0 r. 21 p., f. £3,280
Enclosures of pasture land, 41 a. 3 r. 29 p., f. .. 1,825
Hewington, Somerset.—Chickwell New Farm, 49 a. 2 r. 9 p., f. 1,150
Enclosure of land, 5 a. 1 r. 23 p., f. 140

August 14.—By SHINER & WINTER (at Wrington).

Wrington, Somerset.—The Mill Farm, 99 a. 0 r. 13 p., f. (in lots) 4,110

August 15.—By POOLER & DAVIES (at Newport).

Chadwell, Salop.—Chadwell Court, Chadwell Grange, and the Mill Farms, 546 a. 1 r. 28 p., f. 15,100

August 16.—By E. G. RIGHTON (at Evesham).

Aston-under-Hill, Glos.—Lower Farm, 299 a. 0 r. 38 p., f., with manor 6,500
Middle Farm, 106 a. 0 r. 30 p., f. 4,700
Stanley Farm, 106 a. 2 r. 15 p., f. 3,750
Old House Farm, 70 a. 0 r. 7 p., f. 3,350
Seven cottages with orchard, 2 a. 0 r. 33 p., f. .. 1,120

August 17.—By E. J. GILDERS (at Clacton-on-Sea).

Clacton-on-Sea, Essex.—"The Queen's Arms Hotel," f. 10,250

By ELLIOTT, ELLIS, & CO. (at Plymouth).

Plymouth, Devon.—Westwell-st., a block of warehouses and offices, area 5,000 ft., f. 8,500

By E. J. CARTER (at Maidstone).

Yalding, Kent—The Brook's Enclosure, 72 a. 2 r. 33 p., f. 1,000
The Plantations, 37 a. 2 r. 9 p., f. 1,500

By WORSFOLD & HAYWARD (at Dover).

St. Margarets-at-Cliffe, Kent.—East Valley Farm, 216 a. 3 r. 27 p., f. 2,600

August 18.—By R. HALL, VICKERS, & SHAW (at Lincoln).

East Firsby, Lincs.—Freehold farms, 535 a. 3 r. 18 p. 6,700

August 19.—By DOUGLAS YOUNG & CO. (at Southwold).

Southwold, Suffolk.—The Town Farm Estate, thirty-four plots of building land, f. 4,797
The Raydon Estate, nineteen plots of building land, f. 1,430

By J. CARTER, JONAS, & SONS (at Cambridge).

Cottenham, Cambs.—Enclosures of market garden and orchard land, 65 a. 2 r. 4 p., f. 4,585
Cottenham, &c., Cambs.—Irams Farm, 131 a. 0 r. 7 p., f. 3,250

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
Town Hall	Borough of Workington	40*l.*; 20*l.*; and 10*l.*	Sept. 15
Public Library	Dumfries and Maxwelltown T.C.	Not stated	do.
Bank, Norwich (Local Competition)	Directors of Norfolk & Norwich Savings Bank	50 gns.; 20 gns.; & 10 gns.	Sept. 16
Designs in Tunbridge Ware	Tunbridge Wells Tech Education Com.	3 gns.; 2 gns.; 1 guinea	Sept. 30
New Public Market	Bd. of Public Wks. for Island of New Providence, Bahamas, West Indies	40*l.* 10*l.* 5*l.*	Nov. 30

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Kerbing, &c. Bridge-st. Dollar, N.B.	.....	J. S. Henderson, Town Offices, Dollar	Sept. 9
Intermediate School, Rhyl	.....	J. R. Jones, 4, Brighton-road, Rhyl	do.
Electric Light and Traction Plant	West Ham U.D.C.	W. C. Ullmann, Elec. Engr. White Post-lane East Ham	do.
Tramway Rails	East Ham U.D.C.	do.	do.
Electric Lighting and Traction Plant	do.	do.	do.
Store and Two Houses, School-lane, Brinscall, Lancs.	.....	J. B. Thornley, Archt. Market-st. Darwen	do.
Reconstruction, Invergyle House, Loch Katrine	Glasgow Corp.	J. M. Gale, Engr. 45, Johnst. Glasgow	do.
Reservoir, Cowgill Burn, Airdrie, N.B.	.....	M'Creaths & Stevenson, C.E 208, St. Vincent-street, Glasgow	do.
Nineteen Houses, Netherfield-lane, Parkgate, Rotherham		J. Platts, Archt. High-st. Rotherham	do.
Waterworks	F. Mason	J. Wilson, C.E. 72A, George st. Edinburgh	do.
Cast Iron Pipes, Easter Duddington	Edinburgh Water Trustees	do.	do.
Dry Dock, Portora Point, near Enniskillen	do.	R. S. Moore, Northern Counties Railway Station, Enniskillen	do.
Additions to Vicarage, Keswick	Loch Earne Steamboat Co.	J. H. Martindale, Archt. Viaduct-chmbrs. Carlisle	do.
Rebuilding No. 12, Bridge-st. Cork	.....	J. F. McMullen, Archt. 30 South Mall, Cork	do.
Rebuilding No. 24, Parnell-place, Cork	.....	do.	do.
River Bridge, Walton-le-Dale	J. A. Arnott & Co.	W. H. Radford, Engr. County Offices, Preston	Sept. 11
Water Works, Fairlie	Lancs. C.C.	P. C. Hart, C.E. 32, John Finnie-st. Kilmarnock	do.
Infirmary, &c. at Workhouse	Ayrshire C.C.	E. M. Lougdon, Archt. Town Hall	do.
Free Church Manse, Botriphine, N.B.	Bakewell Union	R. B. Pratt, Archt. County Bank House, Elgin	do.
Additions to Fermoy House, Cork	.....	W. H. Hill & Son, 28, South Mall, Cork	do.
Sewering, &c. Wellington-st.	Arnold (Notts) U.D.C.	J. R. Swift, Front-street, Arnold	do.
New Road, Lansdowne	Bournemouth T.C.	F. W. Lacey, Boro Engr. Town Hall	do.
Main Sewer	Hindley (Lancs.) U.D.C.	A. Holden, C.E. Council Offices	do.
Alterations to The Bungalow, Exmouth	Mrs. Pearse	E. E. Ellis, Archt. Market-street, Exmouth	do.
Sewerage Works, Priest's Moor	Alnwick R.D.C.	H. W. Walton, Council Offices	do.
Steam Pipes, &c. at Electric Station	Carlisle Corp.	Prof. Kennedy, Engr. 11, Victoria-st. S.W.	do.
Additions to Mission Room, Nether Hough, near Greasbrough	.....	J. Platts, Archt. High-st. Rotherham	do.
Hotel, Waterhead, Ambleside	.....	J. W. Grundy, Archt. Ulverston	do.
Restoration, Penrose Almshouses Barnstaple	Charity Commrs.	F. W. Petter, Archt. Barnstaple	do.
Hospital	Barry (Glam.) U.D.C.	J. C. Pardoe, C.E. Council Offices	do.
Farmhouse, &c. Bettws-Garmon, Wales	....	Bowen & Jones, Surv. Carnarvon	do.
Road Works, Mackenzie-street	Carnoustie Commrs.	R. P. Fleming, Burgh Surv. Town Offices	do.
Additions to Offices, Lincoln	Robey & Co.	W. Watkins & Son, Archt 8t. Edmond's-chambers, Lincoln	do.
Engine House, Boiler House, &c. Llanelly	Harbour Commrs.	C. P. Fowler, Engr. Harbour Offices	do.
Workhouse Lodge Enlargement	Macclesfield Union	J. F. May, Union Offices	do.
Repaving at Workhouse	Halifax Union	A. T. Longbotham, 4, Carlton-st. Halifax	do.
Road Works	Berwick-on-Tweed S.A.	R. Dickinson, Boro Surv. Town Hall	do.
House, Wallington, Surrey	.....	S. G. Pailthorpe, Archt. 50 Finsbury-sq. E.C.	do.
Surveyor's Materials	Ramsbottom (Lancs.) U.D.C.	J. Halliwell, Surv. Council Offices	do.
Sewers, Market Place	Bridlington U.D.C.	C. Gray, Victoria Rooms, Bridlington Quay	do.
Additions to Nos. 64, 65 and 66, High-st. Merthyr Tydfil	J. W. Morris	E. M. Bruce Vaughan, Archt. Cardiff	do.
Asylum Superstructure	Croydon Corp.	Boro Engr. Town Hall	Sept. 12
Office and Lavatory Accommodation	Poplar and Stepney Sick Asylum	J. & S. F. Clarkson, 136, High-st. Poplar	do.
Supply of Barges and Removal of Slop, &c.	St. Mary, Islington, Vestry	At Vestry Depot, Liverpool-rd. N.	do.
Dynamos	Hackney Vestry	R. Hammond, C.E. 64, Victoria-st S.W.	do.
Renovation Works, Canal-rd. Bradford	.....	Mines & France, Archt. Bradford	do.
Shop, Warehouses, &c. Endmoor	Kendal Co-op. Soc.	J. Stalker, Archt. 57, Highgate, Kendal	do.
Walls, &c. Clare-street	Bridgwater T.C.	Boro Surv. Municipal-buildings	do.
Boat House	Ebchester Rowing Club	J. Charlton, Belt's Houses, Medomsley, R.S.O.	do.
Bricks (50 000)	Belfast Cemetery Committee	Sir S. Black, Town Hall	do.
Sewers, Victoria-road	Aberdeen T.C.	W. Dyack, Burgh Surv. Town House	do.
Retaining Wall	Salford Corp.	L. C. Evans, Town Hall	do.
Alterations to Engine House	Bournemouth T.C.	F. W. Lacey, Boro Engr. Town Hall	do.
Painting Works on Racecourse	Shinclife and North Durham Steeplechase Co. Ltd.	R. Cole, 51, Gilesgate, Durham	do.
Iron Pipes	Bury Corp.	R. B. Rigby, Parson's-lane, Bury	Sept. 13
Painting Works, Stockton Station	N. E. Ry. Co.	W. J. Cudworth, Engr. Darlington	do.
Additions to Ballbrook House, Bath	.....	W. J. Willcox, Archt. 1, Belmont, Bath	do.
Surveyor's Materials	Croydon R.D.C.	J. Wilson, Town Hall	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Alteration to Town Hall	Bermondsey Vestry	The Surv. Town Hall Bermondsey	Sept. 13
Buildings at Sewage Disposal Works	Stalybridge, &c. Sewerage Bd.	Newton, Son, & Bayley, 17, Cooper-st. Manchester	do.
Electric Light at Town Hall	Bermondsey Vestry	Surveyor, Town Hall, Bermondsey	do.
Additions to Workhouse, Selly Oak nr. Birmingham	King's Norton Union	Whitwell & Son, Archt. 23, Temple-row, Birmingham	do.
Drainage Works, Downderry	St. Germans (Cornwall) R.D.C.	F. W. Cleverton, 4, Buckland-terrace, Plymouth	do.
Road Diversion and Bridges, Redcar	N.E. Ry. Co.	W. J. Cudworth, Engr. Darlington	do.
Restoration, Dewsbury Moor Schools	.....	F. W. Ridgway, Archt. Dewsbury	do.
Club, High-street, Hull	.....	B. S. Jacobs, Archt. Bowl Alley-lane, Hull	do.
Six Houses, Hambleton, Yorks.	Anson Bros.	A. Hartley, Archt. Carlton-chmbrs. Castleford	do.
Two Houses and House and Shop Great Horton, Bradford	.....	S. Spencer, Archt. 344, Great Horton-rd. Great Horton	do.
Fifty-seven Houses, Shildon	N. E. Ry. Co.	W. Bell, Archt. Central Station, Newcastle-on-Tyne	do.
Goods Warehouse, Middlesbrough	do.	W. Bell, Archt. Railway Station, York	do.
Well Sinking, Mildmay-road	Chelmsford T.C.	T. Dixon, 16, London-road, Chelmsford	do.
Additions to Ropner Convalescent Home, Middleton St. George	.....	J. M. Bottomley, Archt 28, Albert-rd. Middlesbrough	do.
Sewage Works	Farnworth U.D.C.	W. J. Lomax, C.E. 11, Fold st. Bolton	do.
Road Making	Stoke-on-Trent Union	C. Lynam, Archt. Stoke-on-Trent	do.
Distribution Works	Corp. of Birmingham	Jas. Mansergh, 5, Victoria-street, Westminster	Sept. 14
Steam Pumps, &c.	Leyton U.D.C.	F. H. Lewis, Engr. Cathall-rd. Leytonstone	do.
Malt Kiln, Bures St. Mary, Suffolk	.....	G. G. Page, Archt. Trinity Chambers, Colchester	do.
Granite and Flints	Sunbury-on-Thames U.D.C.	H. F. Coales, Surv. Council Offices	do.
Repairs to Casual Wards, East Greenwich	Greenwich Union	T. Dinwiddy, 12, Croom's-hill, S.E.	do.
Vicarage House, Sliaden, Yorks.	.....	W. & J. B. Bailey, Archt. 1, Scott-st. Keighley	do.
Block of Houses, Tweedmouth	W. S. Dods	J. L. Miller, Archt. 39, Hide-hill, Berwick	do.
Additions to Zoar Methodist Chapel, Pontardawe	.....	W. W. Williams, Archt. 63, Wind-st. Swansea	do.
Well Sinking	Southborough (Kent) U.D.C.	G. & F. W. Hodson, Engr. Loughborough	do.
Additions to Wesleyan Schools, Buxton-rd. Huddersfield	Trustees	J. Kirk & Sons, Archt. Huddersfield	do.
Erection of Electric Light Station	Walthamstow U.D.C.	E. J. Gowen, Town Hall, Walthamstow	Sept. 15
Block of Schools	Enfield School Board	G. E. L. Laurence, 181, Queen Victoria-st. E.C.	do.
Workhouse Infirmary	Thornbury (Glos.) Union	G. H. Oatley, Archt. Baldwin-st. Bristol	do.
Street Works, Randolph-rd.	Shardlow R.D.C.	T. A. Fuller, Surv. The College, All Saints, Derby	do.
Infirmary at Workhouse	Thornbury Union	G. H. Oatley, Archt. Baldwin-st. Bristol	do.
*Repairing High-st, &c.	Barnet U.D.C.	W. H. Mansbridge, 40, High-st. Barnet	Sept. 16
Laying C.I. Pipes, Stockingford, Nuneaton	.....	J. S. Pickering, Council Offices, Nuneaton	do.
Trial Boring	Warrington Corp.	J Deas, C.E. Bank House Warrington	do.
Asylum, Brentwood	Visitors	Widnell & Trollope, 20 Tothill-st. S.W.	do.
School, Thornhill, Masborough	Rotherham (U.D.) Sch. Bd.	J. E. Knight, Archt. 33, College-st. Rotherham	do.
Road Materials	Newton-in-Makerfield U.D.C.	W. W. Shirley, Town Hall, Earlestown, Lancs.	do.
Sewering, Levelling, &c. Upper Newborough-st. and others	York Corp.	A. Creer, Engr. Guildhall, York	Sept. 18
Additions to School, Tyersal	Bradford Sch. Bd.	E. P. Peterson, Archt. 48, Sunbridge-rd. Bradford	do.
Ten Dwellings, Durnsford-rd.	Wimbledon U.D.C.	C. H. Cooper, C.E. Broadway, Wimbledon	do.
*Supplying Granite Kerb and Setts	Edmonton U.D.C.	G. Eedes Eachus, Town Hall, Lower Edmonton, N.	do.
Additions to Schools	Gwennap (Cornwall) Sch. Bd.	S. Hill, Archt. Redruth	do.
Steel Roofing	Middlesbrough Corp.	D. Terrace, Gasworks, Middlesbrough	do.
C.I. Pipes	Lancaster Corp.	J. Cook, C.E. Town Hall	do.
Making-up John-st. Blackheath	Rowley Regis U.D.C.	D. Wright, Council Offices, Old Hill	do.
Additions to Bank Premises, Skipton	Craven Bank	J. Varley & Son, Engrs. Skipton	do.
Sanitary Work, &c. Park-terrace Pontypool	Trevethin Sch. Bd.	H. Bythway, Sch. Board Offices, Pontypool	do.
Abattoir, Cattle Market	Preston Corp.	Boro. Surv. Town Hall	do.
Two Blocks of Houses, Craigellachie, N.B.	.....	Reid & Wittet, Archt. Elgin	do.
*New Coastguard Buildings at Littlestones in Kent	.....	Director of Works Dept. Admiralty, 21, Northumberland-av. W.C.	Sept. 19
Police Station, Didsbury, Lancs.	Standing Joint Com.	H. Littler, Archt. County Offices, Preston	do.
Movable Floor, &c. Swimming Bath, Cookridge-st.	Leeds Corp.	City Engr. Municipal Buildings, Leeds	do.
Waterworks	Witney U.D.C.	N. Lalley, C.E. 16, Great George-st. S.W.	do.
Strong Room, &c. Long Melford, Suffolk	.....	Fisher & Steed, Long Melford	Sept. 20
House and Shop, Silloth, Cumberland	D. Over	G. Armstrong, Archt. 24, Bank-st. Carlisle	do.
Alterations to Baths, Leaf-street	Manchester Corp.	City Surv. Town Hall	do.
Filter Beds, Pembury	Tunbridge Wells Corp	W. C. Cripps, Town Hall	do.
Reservoir, Crosbie Dykes	West Kilbride Water Com.	Warren & Stuart, C.E. 115, Wellington-st. Glasgow	do.
*Fire Appliances at Workhouse and Schools, Leytonstone, Essex	West Ham Union	Dunford, 100c, Queen Victoria-st. E.C.	do.
*Construction of Filter Beds and Waterworks, Pembury	Borough of Tunbridge Wells	Borough Surv. Town Hall, Tunbridge Wells	do.
*Electric Generating Station and Works	Parish of St. Mary, Battersea	Municipal-bldgs. Lavender Hill, S.W.	do.
Iron and Steel Work Bridge, Aireworth	Keighley Corp.	W. H. Hopkinson, C.E Boro Engr. Town Hall	Sept. 21
Street Works, King-street, &c.	Hoyland U.D.C.	W. Farrington, C.E. Town Hall	do.
Workhouse, Llwynpia	Pontypridd Union	E. C. Spickett, Union Offices, Pontypridd	Sept. 23
Building Works at Workhouse	Cerne Abbas Union	A. E. A. Cole, Union Offices, Cerne Abbas, Dorset	Sept. 25
Schools, Clones, Ireland	.....	T. Elliott, Archt 27, Darling st. Enniskillen	do.
Reconstructing Bridge, Wisley	Guildford R.D.C.	N. Lalley, C.E. 16, Great George-st. S.W.	do.
*Old Granite Pitching	Vestry of St. Marylebone	The Court House, Marylebone-lane, W.	do.
School, Westoe-road	South Shields Sch. Bd.	F. Rennoldson, Archt. 37, King-st. South Shields	Sept. 26
Stone, Road Metal, &c. (2,500 tons)	Erdington U.D.C.	H. B. Humphries, Engr. Public Hall	do.

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p. —. Contracts, pp. iv. vi. viii. x. & xix. Public Appointments, pp. xvii. & xix.*

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
*Erection of New Out Office at Gamuel road Schools	Walthamstow Sch. Bd.	W. A. Longmore, Bridge Chmbrs. Hoe-st. Walthamstow	Sept. 26
Structural Alterations, Woodfield House	Paddington Gdns.	F. J. Smith, Parliament-Mansions, Victoria-st. S.W.	Sept. 27
School, Stanwell-road	Staines Sch. Bd	Murray & Dibdin, Archt. 5, Hurstbourne-rd. Forest-Hill, S.E.	Sept. 28
Cottage Hospital, Hallwill, Devon	.....	C. F. A. Voysey, Archt. 6, Carlton-hill, N.W.	Sept. 30
Stabling, Workshops, &c.	Handsworth (Staffs) U.D.C.	E. Kenworthy, C.E. Council House	Oct. 2
Widening Rookery-road	do.	do.	do.
*Widening, &c. Surly Hall-road, Clewer Without	Windsor R.D.C.	W. Menzies, Englefield Green, Surrey	do.
*Underground Urinal, Blackheath	L.C.C.	Archt's Dept. Spring-gardens, S.W.	Oct. 3
Extension of County Hall, Lewes	East Sussex C.C.	F. J. Wood, Cty. Surv. County Hall, Lewes	do.
Septic Tanks and Filter Beds	West Bridgford (Notts) U.D.C.	W. Pare, George-rd. West Bridgford	Oct. 6
Waterworks	Londonderry T.C.	J. S. Barnhill, C.E. 1a, Strand, Derry	Oct. 10
*Erection of Asylum at Tooting Bec Common	Metropolitan Asylums Board	A. & C. Harston, 15, Leadenhall-street, E.C.	Oct. 11
*Erection of Workhouse Infirmary, &c.	Wolverhampton Union	A. Marshall, King-street, Nottingham	Oct. 12
House and Buildings at Grammar School, Doncaster	Trustees	R. & W. Dixon, Archt. Barnsley	No date
Two Houses, Claxton Farm Estate, Gateshead	.....	B. F. Simpson, Archt. 12, Grey-st. Newcastle	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Additions to Royal Hotel, Clacton	.....	A. Sykes, 45, Finsbury-pavement, E.C.	No date
House, Nab Wood, Bradford	.....	H. & E. Marten, Archt. 5, Charles-st. Bradford	do.
Bridge, Longthwaite, Borrowdale	.....	T. Wren, Longthwaite, Borrowdale	do.
Boundary Walls, Burneside-rd. Kendal	.....	Owner, 7, Sandes-avenue, Kendal	do.
Shop, George-street, Pontypool	.....	Bevan & Co. Ltd. Pontypool	do.
Rails and Fishplates	Newcastle-upon-Tyne Corp.	City Engr. Town Hall	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
Clerk of Works	Boro of Warrington	.....	Sept. 9
Town Surveyor	Bangor (Ireland) U.D.C.	100*l.* per ann.	Sept. 13
*Superintendent of Roads	Vestry of St. John, Hampstead	2*l.* 2*s.* per week	Sept. 21

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. —. *Contracts, pp.* iv. vi. viii. x. & xix. *Public Appointments, pp.* xvii. & xix.

By STEPHENSON & ALEXANDER (at Cardiff).
Dinas Powis, Glamorgan.—A close of building land, 2 a. 3 r. 8 p., f. £340
August 22.—By PROTHEROE & MORRIS (on the estate).
Fambridge-on-the-Crouch, Essex.—Main-rd., &c., 324 plots of building land, f. 2,082
By W. ROLFE (at Masons' Hall Tavern).
City of London.—Aldersgate-st., "The Red Lion" p.-h. u.t. 37½ yrs., r. 125*l.*, with goodwill 21,000
New Bond-st.—"The Blenheim" p.-h., u.t. 28 yrs., r. 500*l.*, with goodwill 12,450
August 23.—By SIMMONS & SONS (at Basingstoke).
Wootton St. Lawrence, Hants.—Upper Farm, 69 a. 0 r. 6 p., f. 2,900
By M. DEROME & SON (at Grasmere).
Grasmere, Westmoreland. — Lower Broadrain Farm, 94 a. 0 r. 9 p., f. 1,500
Tongue Gill Cottage, and 3 r. 15 p., f., r. 30*l.* .. 755
Enclosures of land, 35 a. 1 r. 31 p., f. 2,470
By G. HONE (at Tewkesbury).
Chaceley, Worcester. — Enclosures of meadow land, 23 a. 0 r. 17 p., f. 750
Tinley, Glos.—The Great Cumberwood Estate, 194 a. 2 r. 0 p., f. 6,950
Town-st.—Two freehold cottages and 2 r. 7 p. .. 215
August 24.—By RAVNBIRD & SONS (at Basingstoke).
Weston Patrick, Hants.—Lea Barn Farm, 134 a. r. 7 p., f. 600
By H. J. AUSTEN & SONS (at Maidstone).
Horsmonden, Kent.—Bassett's Farm, 27 a., f. 1,175
By STIMSON & SONS.
Spitalfields.—17, Quaker-st.; 9 and 10, Pope's Head-court and the "Castle" p.-h., f., r. 137*l.* 8*s.* 2,630
Southwark.—46, Borough High-st., f., r. 90*l.* 1,290
Thornton Heath.—58 and 60, Livingstone-rd., f... 530
Lewisham.—78, Court Hill-rd., u.t. 67 yrs., g.r. 8*l.* 10*s.*, r. 47*l.* 10*s.* 400
Forest Hill.—Marler-rd., a plot of land with buildings thereon, u.t. 94 yrs., g.r. 10*s.* 240
Old Kent-rd.—2, Hyndman-st., u.t. 45 yrs., g.r. 4*l.* 200
Peckham Rye.—24, Rye Hill-pk., u.t. 66 yrs., g.r. 9*l.*, r. 38*l.* 165
Walworth.—16 and 18, Kingston-st., u.t. 59 yrs., g.r. 7*l.* 430
Brixton.—54, Craster-rd., u.t. 77 yrs., g.r. 7*l.* 10*s.*, e.r. 50*l.* 400
By NEWBON, EDWARDS, & SHEPHARD.
Walton-on-Thames.—Oatland's Drive, High View, and about 2 a., f. 3,000
Highbury.—77, 81, 83, and 85, Highbury-quadrant, u.t. 50 yrs., g.r. 30*l.*, r. 171*l.* 1,705
Barnsbury.—23, Richmond-cres., u.t. 51 yrs., g.r. 8*l.*, r. 55*l.* 530
Stoke Newington.—19, 21, and 23, Woodland-rd., u.t. 65 yrs., g.r. 15*l.* 720
Rotherhithe.—32, Princes-st., f., r. 24*l.* 425
Stoke Newington.—39, Lordship-rd., u.t. 63 yrs., g.r. 6*l.*, e.r. 42*l.* 385
King's Cross.—26, Dennis-st., u.t. 43 yrs., g.r. 6*l.*, r. 31*l.* 10*s.* 210
Harlesden.—25, Bruce-rd., u.t. 79 yrs., g.r. 7*l.*, e.r. 36*l.* 285
Caledonian-rd.—32, Lyon-st., u.t. 45 yrs., g.r. 5*l.* 230
August 25.—By HUSSEY & SON (at Exeter).
Tedburn St. Mary, Devon.—Little Woodhay and 42 a. 0 r. 20 p., f. 500
Fairwood Farm, 117 a. 2 r. 30 p., f. 1,260
By WARNER & KING (at Stourport).
Rock, Worcester.—Heightington House with smithy and 59 a. 0 r. 33 p., f. 2,045
By DYER, SON, & HILTON (at Forest Hill).
Forest Hill.—11, Bovill-rd., u.t. 94 yrs,, g.r. 5*l.* r. 40*l.* 500
August 26.—By STEPHENSON & ALEXANDER (at Cardiff).
Cardiff, Glamorgan.—27, Millicent-st., u.t. 900 yrs., g.r. 1*l.* 15*s.* 350
131 and 133, Broadway, u.t. 73 yrs., g.r. 7*l.* 7*s.*.. 400
18 to 24, Telford-st., u.t. 84 yrs., g.r. 14*l.* 2*s.*.... 400
King's-rd., f.g.r. 5*l.*, reversion in 982 yrs. 115
August 29.—By MORGAN, BAINES, & CLARK.
New Malden, Surrey.—Sycamore-road, Chiltern Lodge, u.t. 81 yrs., g.r. 12*l.*, e.r. 85*l.* 760
By H. N. ABRAHAMS (at Masons' Hall Tavern).
Wandsworth.—St. Ann's Hill, "The Star and Garter" p.-h., f. 14,500
F.g.r. 6*l.* 5*s.* per annum, reversion in 67 yrs..... £210
By E. C. STRETCH (at Hesketh Bank).
Hesketh Bank, &c., Lancs.—Freehold farm buildings and enclosures of moss land, 83 a. 2 r. 20 p. 5,120
August 30.—By C. & H. WHITE.
Hampstead-rd.—19, Ampthill-sq., u.t. 44 yrs., g.r. 10*l.*, e.r. 80*l.* 665
Blackfriars.—53, Gray-st., f. 380
By HINCKS & SHAKESPEAR (at Leicester).
Oadby, Leicester.—The Brocks Hill Estate, 107 a. 1 r. 9 p., f. 10,250
Two closes of pasture adjoining, 23 a., f. 1,518
By JOHN PARKINSON & SON (at Barnard Castle).
Startforth, Yorks.—North Field Farm, 64 a. 1 r. 8 p., f., with The Manor of Bowes, and 45¾ stints on Bowes Moor 1,840

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c

TO CORRESPONDENTS.

J. L.—H. S. (Amounts should have been stated).

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We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

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TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is given, nor any list in which the lowest Tender is under £100, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

ALDERSHOT.—For additions, &c., to West End schools. Messrs. Friend & Lloyd, architects, Aldershot:—

Martin, Wells, & Co.	£589	J. Charles	£439
G. Kemp	534	W. Garland*	346
W. L. Edgoose	449	[All of Aldershot.]	

ANNFIELD PLAIN (co. Durham).—For providing and laying sanitary pipe sewer (700 yards), South Medomsley, for the Urban District Council. Mr. T. J. Trowsdale, surveyor, Council Offices, Annfield Plain:—

Joseph Dunn	£287 17 10
T. Gatess, West Kyo, Annfield Plain*	265 2 0

ANNFIELD PLAIN (co. Durham).—For extensions at sewage disposal works, West Kyo, for the Urban District Council. Mr. T. J. Trowsdale, surveyor, Council Offices, Annfield Plain:—

R. T. Johnson	£505 15 8	J. Dunn, Annfield Plain*	£467 1 11
Thos. Gatess	496 12 6		

BASING.—For the erection of a pair of cottages, Basing, for Mr. George Randall. Mr. James Gibson, architect, Basingstoke:—

Musselwhite & Son	£515 17	J. Harris	£493 15
H. Mundy	498 0	G. Hooker*	489 0

ATHERSTONE.—For the execution of sewage disposal works, Dordon, Polesworth, for the Rural District Council. Mr. W. R. H. Chipperfield, C.E., Council Offices, Atherstone:—

Sewage Tank.
A. G. Fox, Atherstone* £298 0
Oil Engine.
Hornsby & Son, Grantham* 370 0
Per Ton Iron Pipes.
Staveley Coal and Iron Company, Chesterfield* 7 0
Per Ton Specials.
Staveley Coal and Iron Company, Chesterfield* 10 0
Iron Building for Engine House.
Bradley Bros., Dudley* 56 10

BASINGSTOKE.—For the erection of the Isolation Hospital, Basingstoke, for the Urban District Council. Mr. James Gibson, architect, Basingstoke. Quantities by the architect:—

Martin, Wells, & Co.	£6,100 0	Bottrill & Son	£5,578 0
J. Thumwood	5,769 14	McCarthy E. Fitt*	5,555 0
Musselwhite & Son	5,689 0		

BLACKBURN.—For the erection of store premises, for the Brewery Company, Limited. Mr. J. Berriwistle, architect, Tackett's-street, Blackburn. Quantities by the architect:—

Builders' Work.
John Boland, Whalley New-road, Blackburn* £542
Fireproof Work.
The Phœnix Fireproof Company, Ardwick, Manchester* £791

CHESTER-LE-STREET.—For sewerage construction, High Rows, Usworth, for the Rural District Council. Mr. J. H. Mole, surveyor, Council Offices, Chester-le-Street. Quantities by surveyor:—

John Carrick	£537 0 0	William Rutter, Washington Station*	£435 0 0
Walter Craig	495 16 10		
Thos. Robinson	465 4 8		

EGREMONT (Cumberland).—For the erection of shop and warehouse, South-street. Mr. J. S. Stout, architect, Gillfoot, Egremont:—

Masonry.—J. Smith, Egremont*	£206 0
Joinery.—T. & W. Robinson, Egremont*	135 17
Plumbing.—W. Stratheme, Whitehaven*	33 18
Slating and Plastering.—H. Tyson, Whitehaven*	57 0
Painting.—H. Smith, Beckemet, via Carnforth*	9 10

ELGIN (N.B.).—For the erection of a residence, Mayne-road. Mr. R. B. Pratt, architect, County Bank House, Elgin:—

Masonry.—James Young, Elgin	£550 0
Carpentering.—A. & R. Dunbar, Elgin	333 0
Plumbing.—Hunter Clark, Elgin	167 17
Slating.—James Wilson, Elgin	67 10
Plastering.—George Gray, Elgin	94 18
Painting.—Fordyce, Elgin	41 5
Total	£1,254 10

ENFIELD.—For the construction of underground convenience, Market-place, Enfield Town, for the Urban District Council. Mr. Richard Collins, Surveyor, Council Offices, Enfield:—

Fleming & Co.	£1,190	Finch & Co.	£650
Bolding & Sons	1,140	E. J. Betts, Enfield Highway*	595
Doulton & Co.	685		

FARNHAM.—For re-erection of "The Grenadier" public-house, Heath End, Farnham, for the Army and Navy Co-operative Breweries. Messrs. Friend & Lloyd, architects, Aldershot:—

Martin, Wells, & Co.	£1,320 0	S. W. Gibbs	£785 10
J. W. Gunstone	952 10	F. Knight	755 0
		W. L. Edgoose	715 0

[*See also next page*

GRAYS.—For alterations and additions to the Grays Co-operative Industrial and Provident Society, Limited, Grays, Essex. Mr. Christopher M. Shiner, architect, 3, Bond-court, Walbrook, E.C. :—

F. & E. Davey	£5,230	Sims & Woods	£3,380
Wm. Potter	3,600	J. J. Lawrence	3,125

HALIFAX.—For the execution of asphalt works (1,173 yards or thereabouts), for the Union Guardians :—
C. Kershaw, Brighouse* ..... 1s. 4d. per yard.

HALIFAX.—For the erection of school and house, Southowram Bank. Mr. J. F. Walsh, architect, Lancashire and Yorkshire Bank-chambers, Halifax :—

Mason.—Adam Foster	£808	0	0
Concretor.—L. Lister, Hipperholme*.	63	10	0
Slater.—L. Lister, Hipperholme*	97	0	0
Plasterer.—L. Lister, Hipperholme*.	64	15	0
Joiner.—J. Booth	250	13	9
Plumbers.—Fawley & Sons, Halifax*.	107	0	0
Heaters.—Fawley & Sons, Halifax*..	66	0	0

HARTLEY WINTNEY (Hants).—For the execution of sewage filtration works, for the Hartley Wintney Rural District Council. Messrs. Fairbank & Son, engineers, 13, Lendal, York. Quantities by engineers :—
Thomas Bell, Market Weighton, Yorks*. £2,079 4 8

HERNE BAY.—For the erection of the Passmore Edwards' convalescent home for railway men for the trustees. Mr. A. Saxon Snell, architect. Quantities by Mr. Bernard Swinstead :—

W. Downs	£9,890	0	
Parramore	9,741	0	
W. J. Adcock	9,205	18	
Denne & Sons	9,200	0	
T. G. Sharpington	9,059	0	
W. W. Martin	8,934	0	
Peacock Bros.	£8,608	0	
J. Carmichael	8,544	0	
Spencer, Santo, & Co.	8,504	0	
Wall & Co., Kentish Town*	8,367	0	

LONDON.—For additions to London and County Bank, Harrow-road, Paddington, W. Mr. Thomas Dinwiddy, architect, 54, Parliament-street and Greenwich :—

F. T. Chinchen	£2,594	W. Mills*	£2,449
Ransom & Co.	2,510		

LONDON.—For new London and County Bank branch and business premises at East Greenwich. Mr. T. Norman Dinwiddy, architect, 54, Parliament-street and Greenwich :—

J. & A. Oldman	£3,166	W. Mills	£3,065
Jones & Groves	3,155		

SHEFFIELD.—For alterations to shops, Moorhead, for Mr. Thomas Hill. Mr. J. P. Earle, architect, Norfolk-row, Sheffield :—
Wilkinson & Sons, Sheffield* £453

STEVENAGE.—For the supply of broken granite, for the Urban District Council of Stevenage :—

W. Griffiths	12s. 3d. and 16s. 6d.
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Van Praagh & Co., Ltd., 6, East India-avenue, E.C.*	11s. 9d. and 11s. 6d.

TARVIN (Cheshire).—For the construction of waterworks, for the District Council. Mr. H. B. Killon, C.E., 22, Cooper-st., Manchester :—

Contract No. 1.

C. John Nevitt, Bailey-street, Stafford*.. £3,174 8 5

Contract No. 2.

C. John Nevitt, Bailey-street, Stafford*.. 1,154 18 6

WOKING.—For additions to "Robin Hood" inn, Goldsworth. Mr. W. G. Lower, architect, 12A, High-street. Guildford :—

Sims & Woods	£2,044	9	8	S. Ellis	1,494	0	0
F. Milton	1,780	0	0	J. Gosden, Woking*	1,448	0	0
F. W. Reavell	1,600	0	0				

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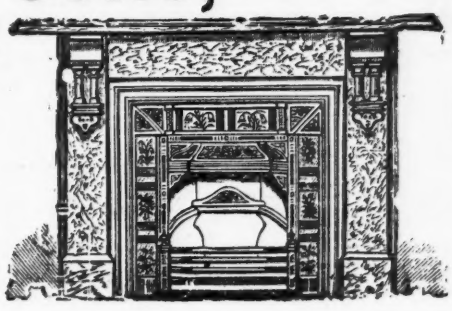

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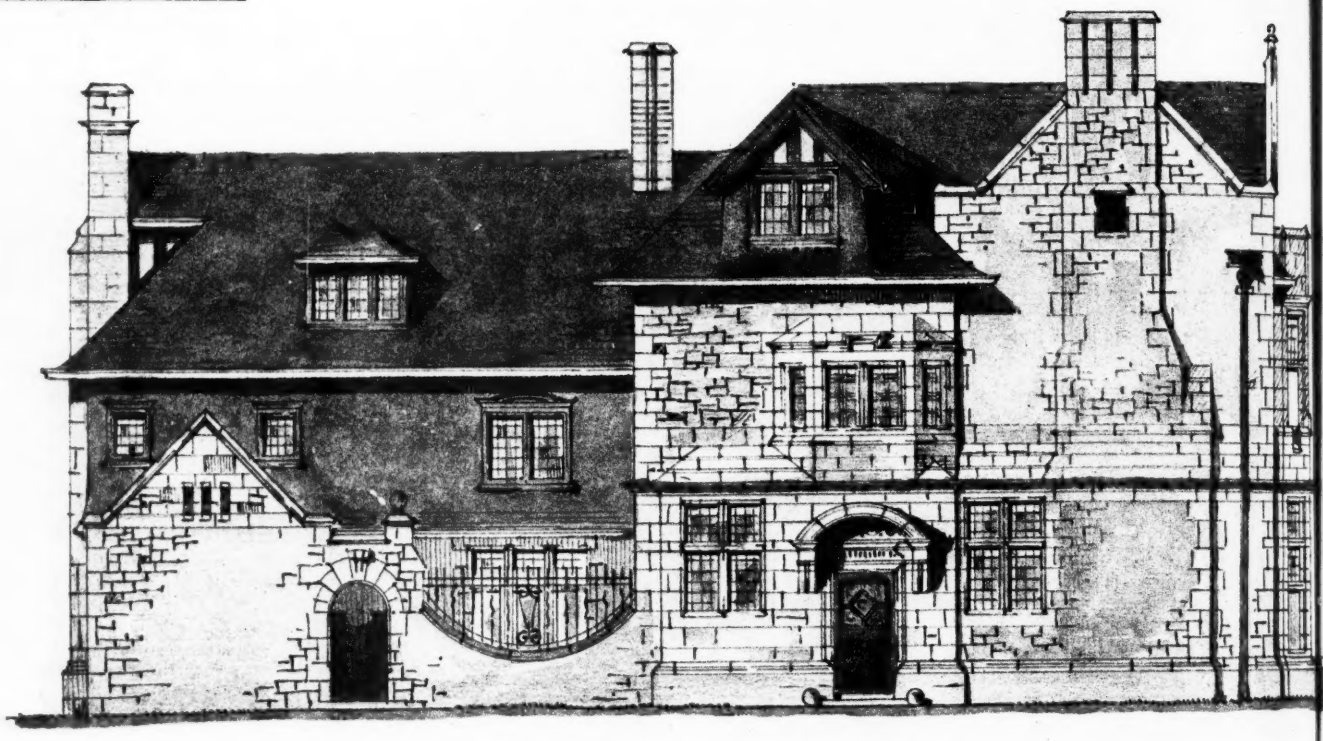

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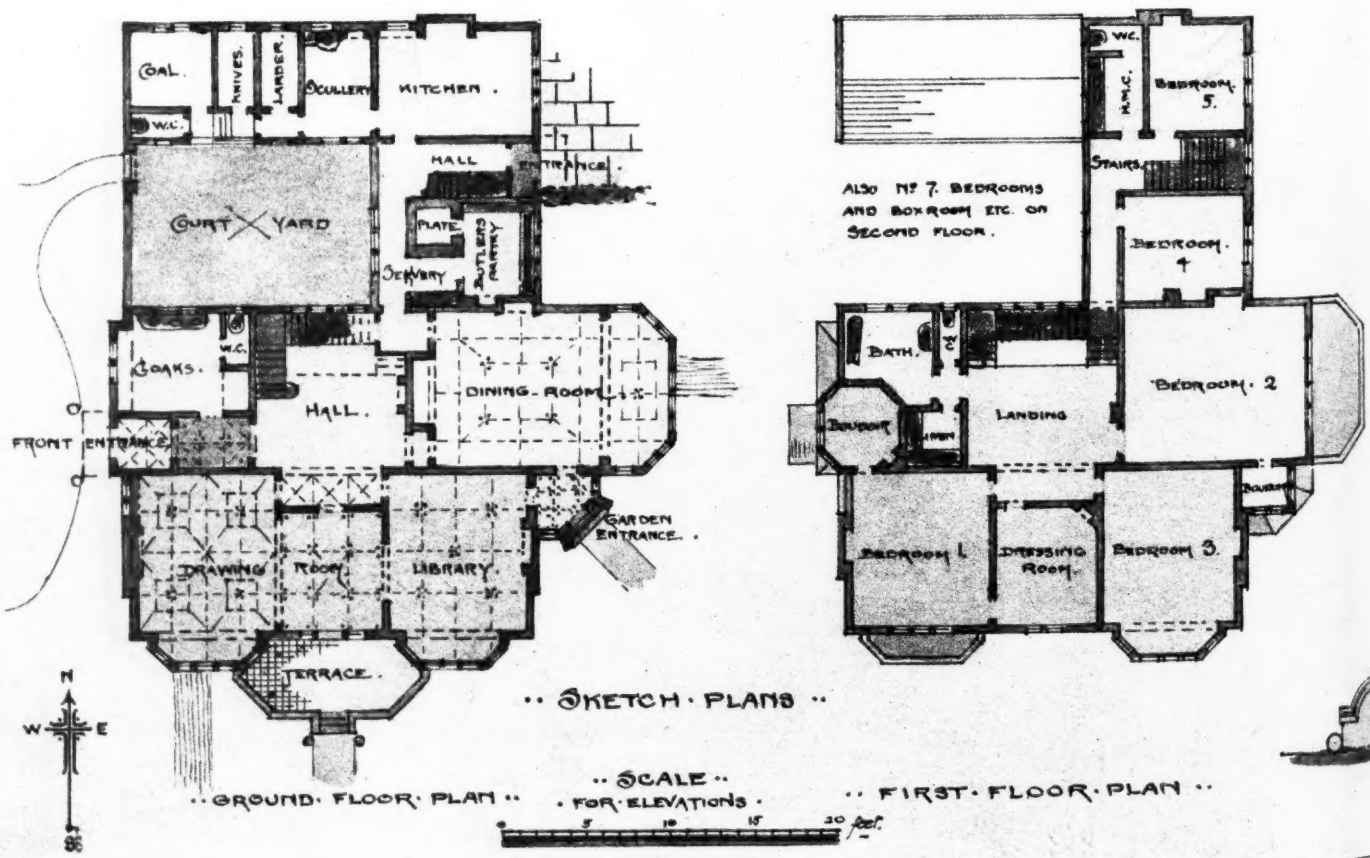

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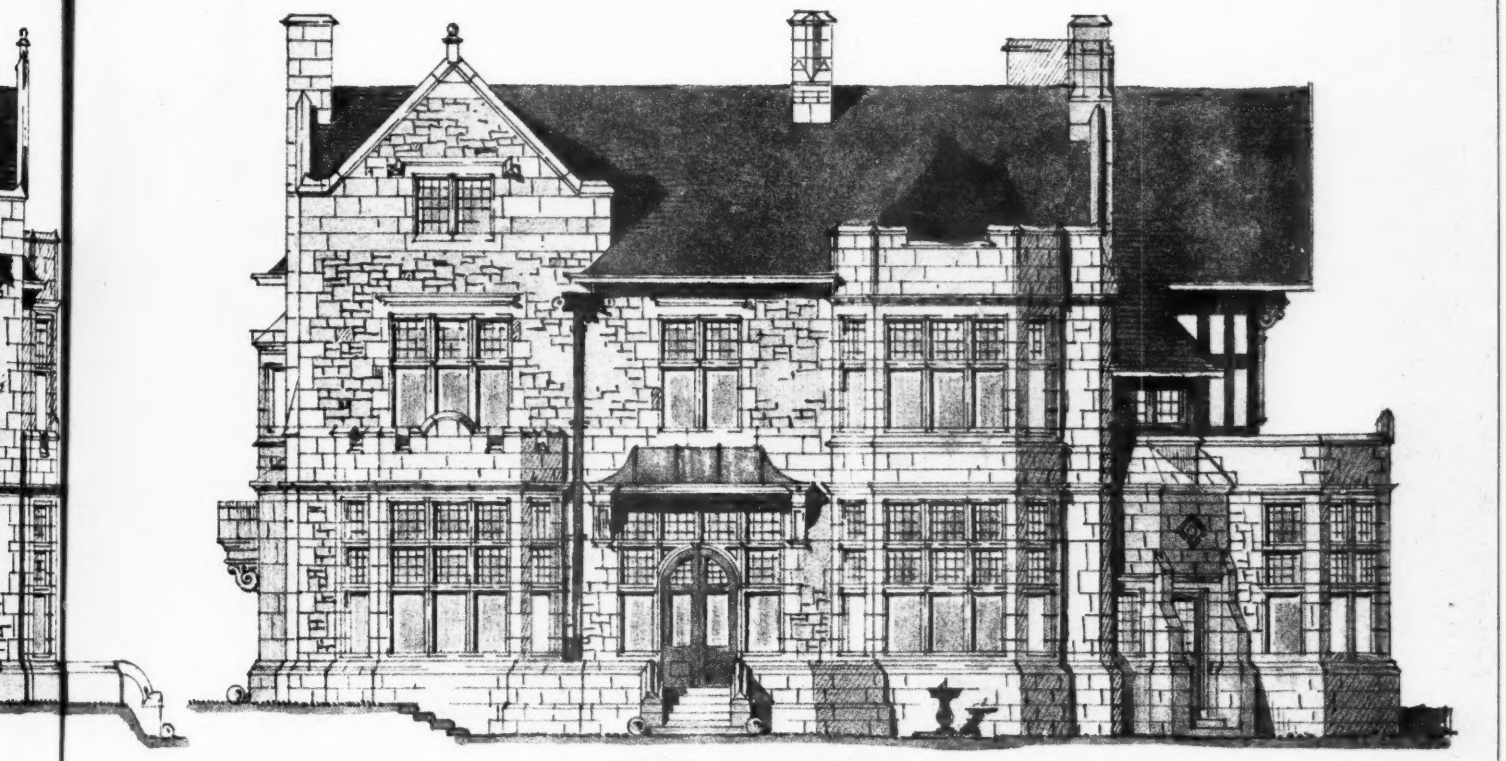

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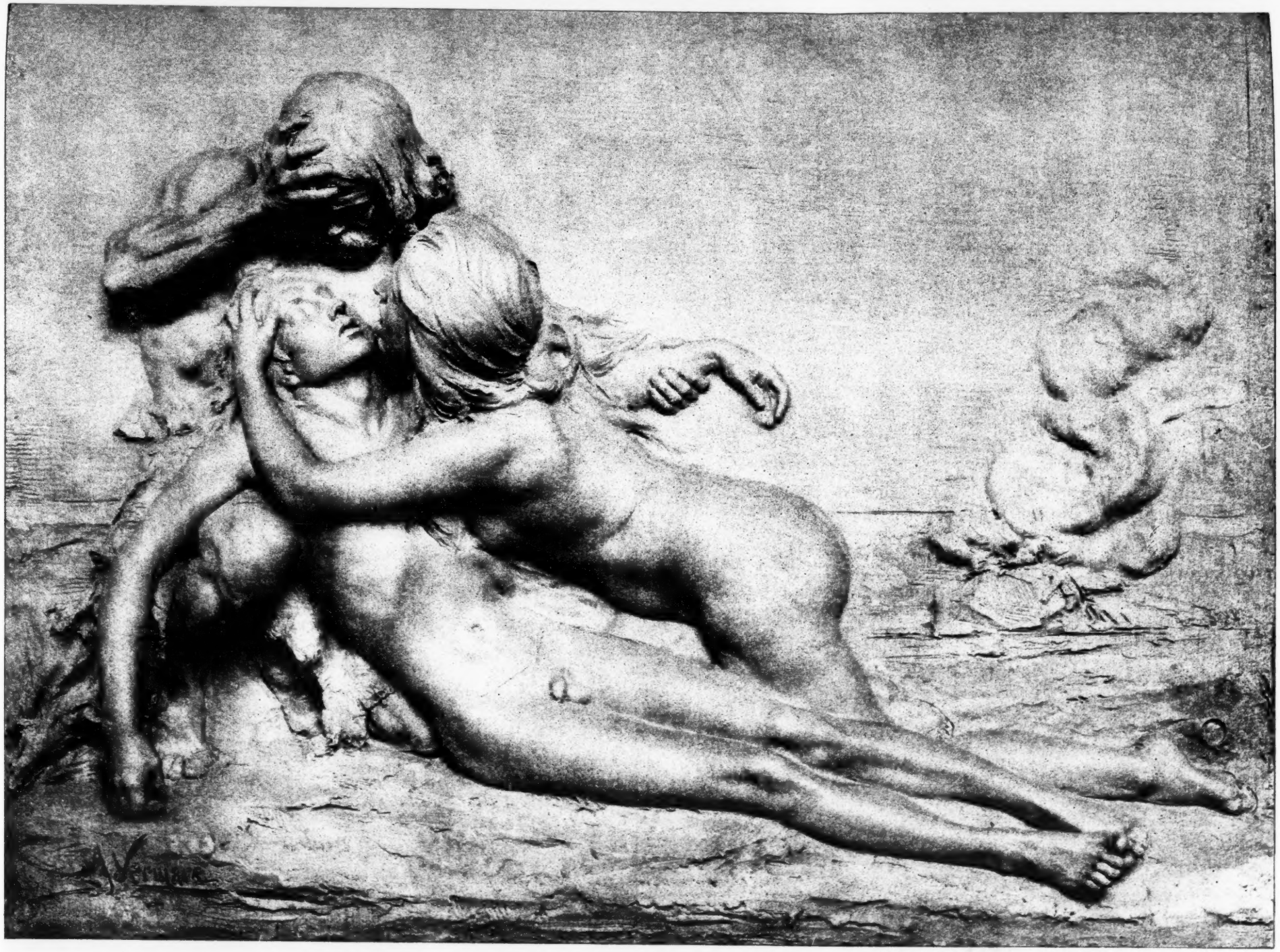

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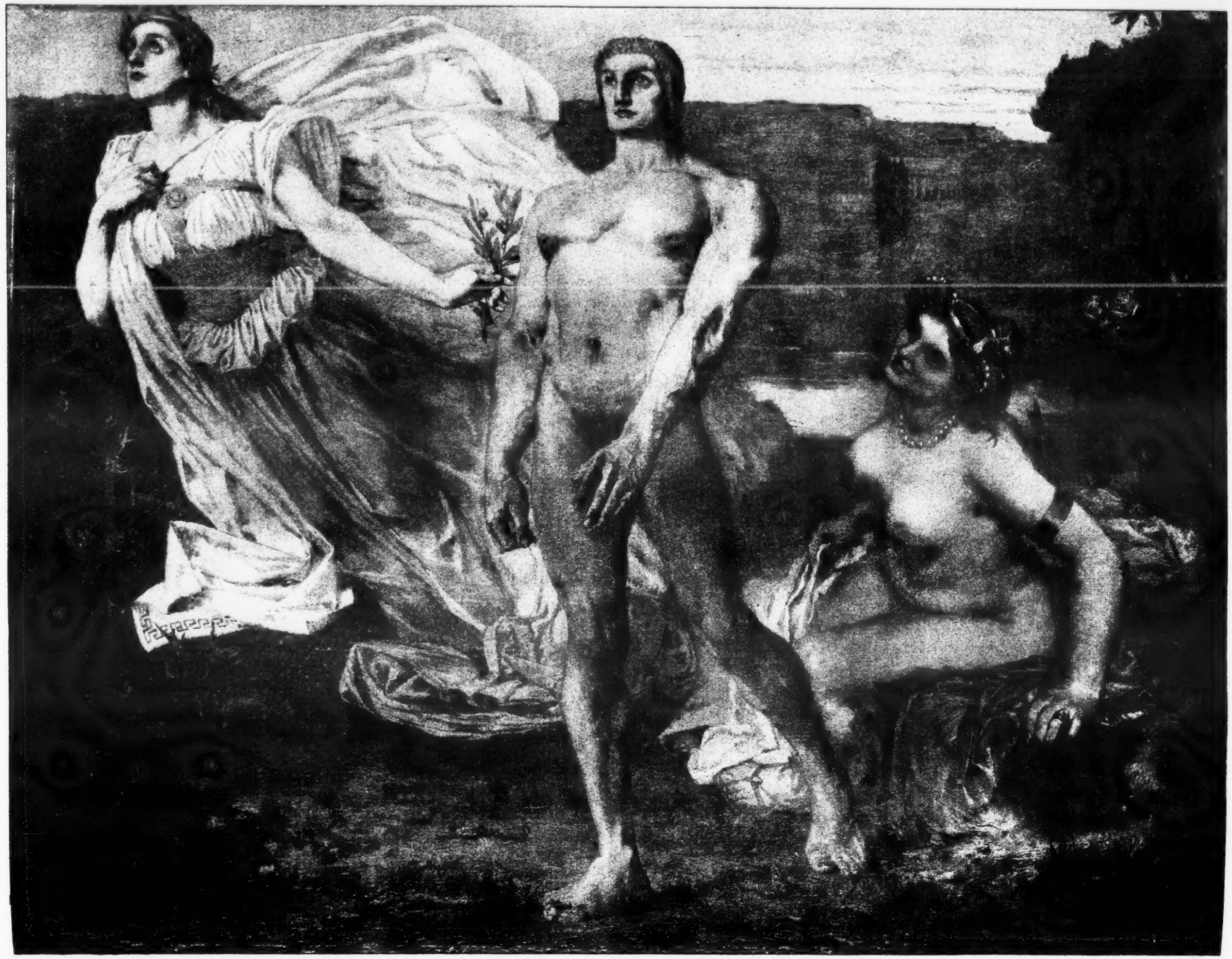

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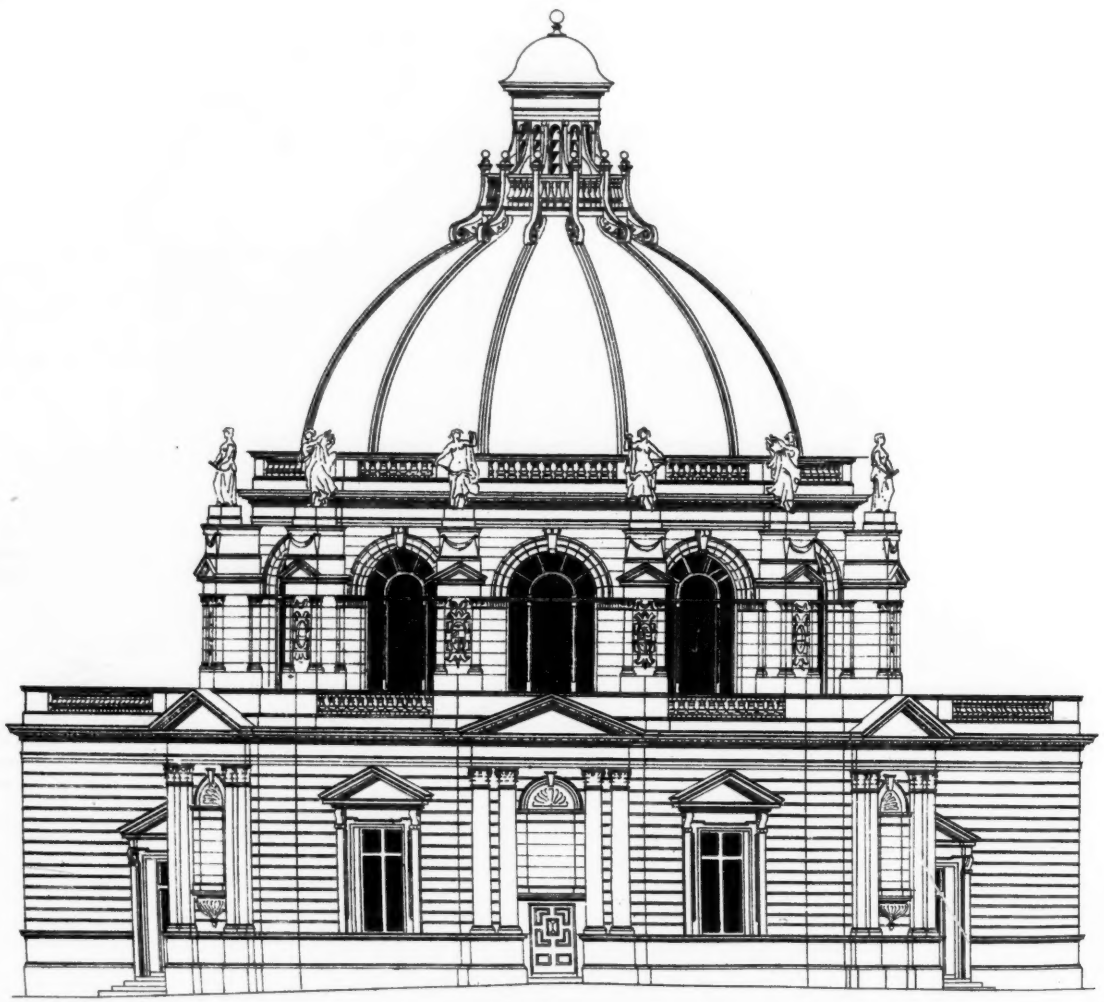

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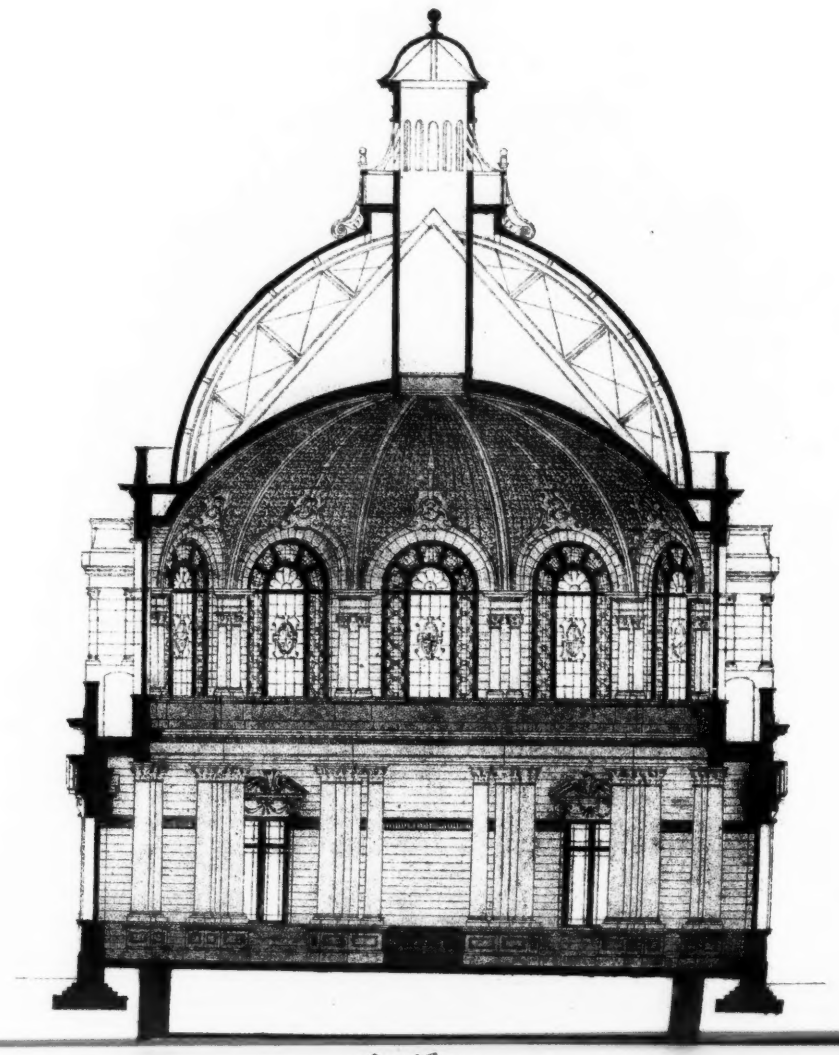

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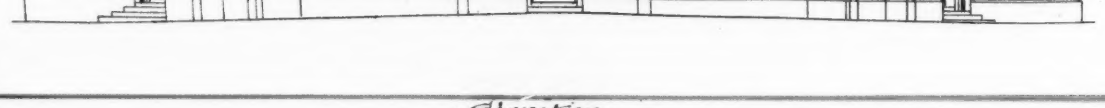

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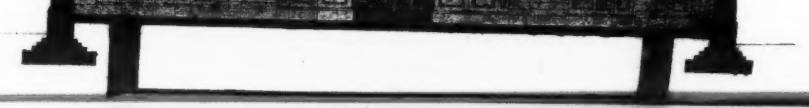

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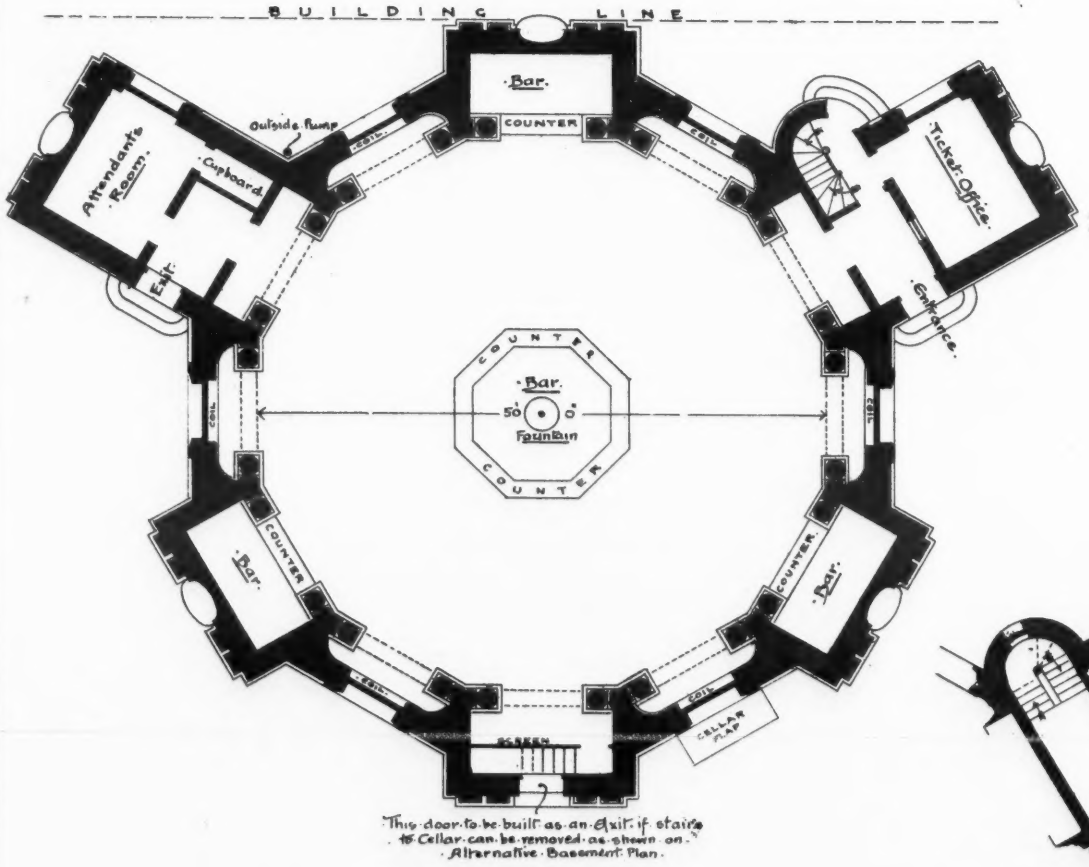
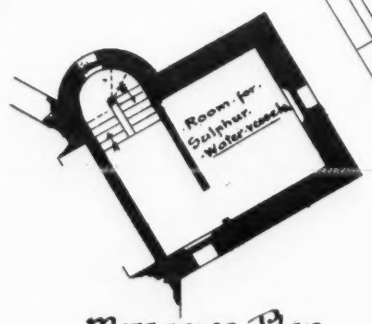
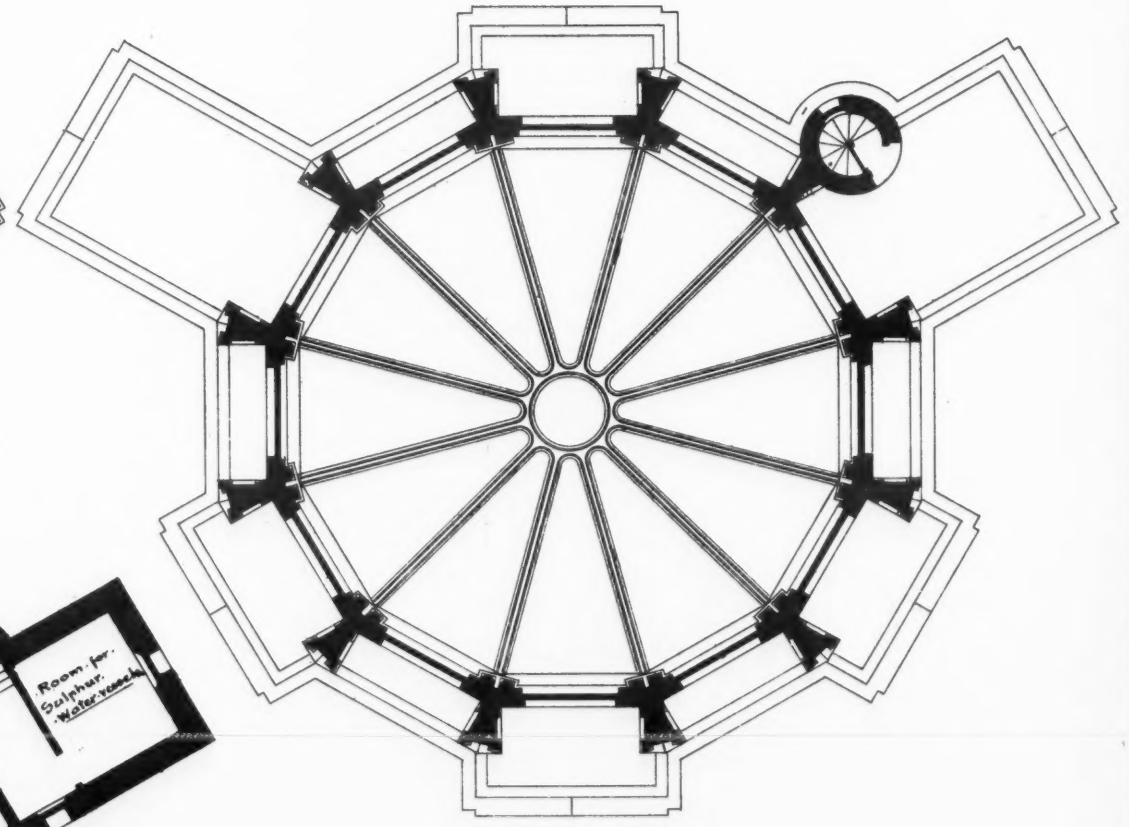


Ground Floor Plan



Mezzanine Plan



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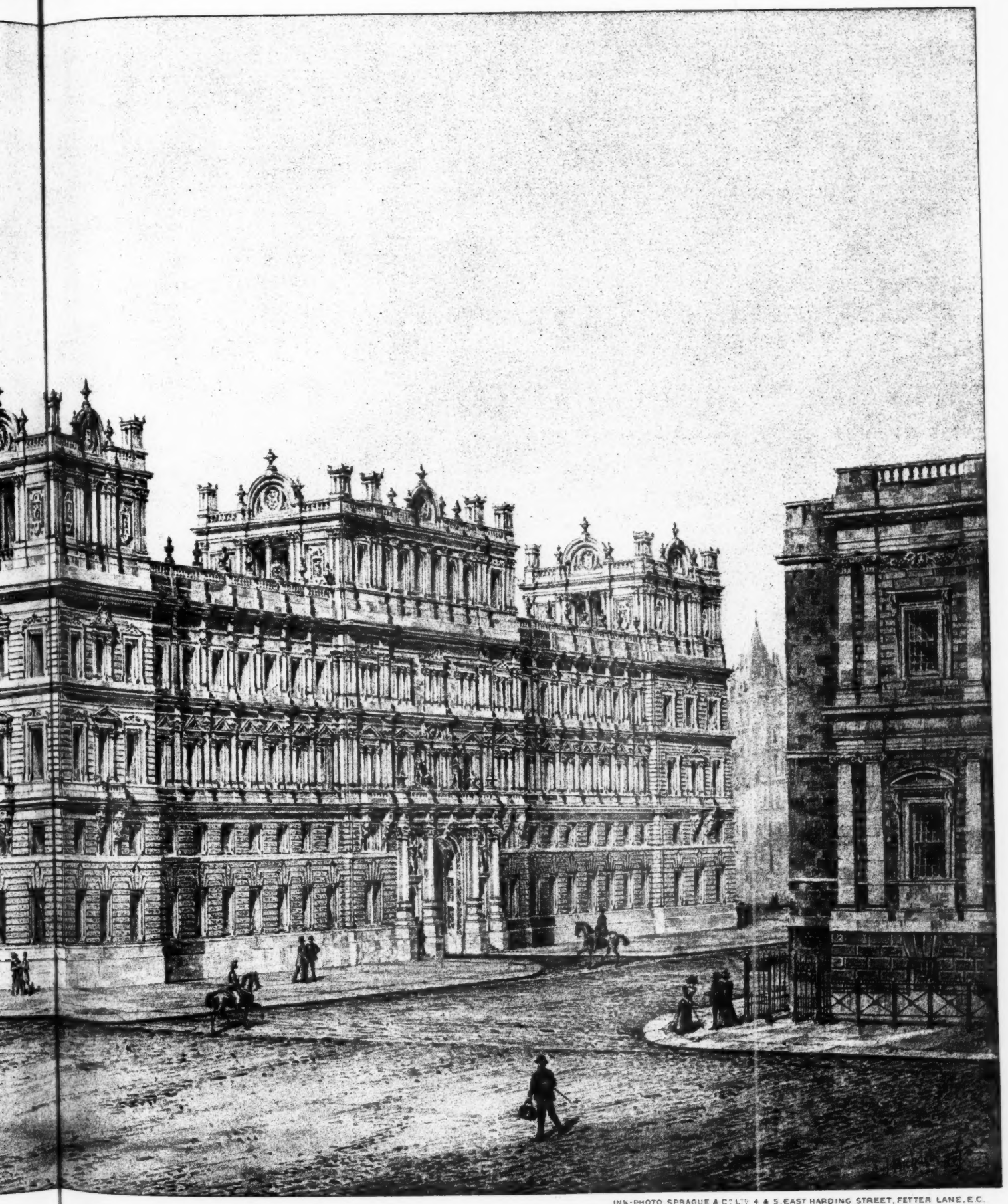

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